JPRS-UBB-84-019

21 August 1984

USSR Report

LIFE SCIENCES

BIOMEDICAL AND BEHAVIORAL SCIENCES

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AGROTECHNOLOGY

INTRODUCI[illegible] FINISHED SCIENTIFIC RESEARC[illegible] DEVELOPMENTS FROM PLANT PHYSIOLOGY INSTITUTE OF UkSSR ACADEMY OF SCIENCES INTO PRODUCTION

Kiev FIZIOLOGIYA I BIOKHIMIYA KUL'TURNYKH RASTENIY in Russian No 1, Jan-Feb 84 (manuscript received 15 Mar 83) pp 83-87

[Article by G. S. Ponomarev, Plant Physiology Institute of the UkSSR Academy of Sciences Kiev]

[Text] The present paper describes the status of and prospects for introduction of finished scientific research developments into production and the size of the economic effect from utilizing methods and technology proprosed by the institute in agriculture in the Ukrainian SSR.

The 26th CPSU Congress, in putting forward a broad program for social development and raising the people's standard of living, has assigned top priority to the goal of providing the population with food products. The USSR Food Program up to 1990 was developed to meet this goal. The program calls for providing the population with a steady supply of all types of food products within the shortest possible time, as well as making substantial improvements in the eating patterns of the Soviet people by including more nutritious foods. In connection with this, along with deepening and intensification of fundamental scientific research in the area of biology and agriculture, the development and incorporation into production of applied problems, the resolution of which will make it possible to achieve practical, tangible progress in this sector, are taking on special importance. The decisions of the May (1982) Plenum of the CPSU Central Committee and the June (1982) Plenum of the CPUk Central Committee on the future development of science and technology are a call to action in this area.

Plant physiology is a fundamental biological science. However, in the course of theoretical research it offers unlimited possibilities for resolving a broad range of applied problems in the area of providing plants with macro- and microelements, the use of biologically active subtances, increasing plants' resistance to unfavorable environmental factors, increasing plants' coefficient of utilization of solar energy, physiological aspects of selection, biological fixing of nitrogen, the use of nuclear radiation, and so on. The utilization of achievements in biochemistry and biophysics contributes to this work to a significant degree. This approach to organization of the research process made it possible for scientists at the Plant Physiology Institute of the UkSSR Academy of Sciences, in addition to continuous development of fundamental

research, to resolve a whole series of practical questions, which are being introduced successfully into agricultural production on a fairly large scale.

Over the course of many years the institute has been working on a study of the biological role of microelements in the life of plants. On the basis of the study of the influence of the microelements boron, manganese, molybdenum, copper, zinc, and lithium on the exchange of substances in plants, the preconditions were developed for creating new types of preparations and fertilizers containing microelements. In cooperation with the Vinnitsa and Sumy chemical enterprises, the institute created and has put into production manganic and borate superphosphate. Kolkhozes and sovkhozes in the Ukrainian SSR and other republics have been supplied with over 2 million tons of manganic superphosphate. The following data tell of the economic effect obtained in agriculture from the use of this fertilizer in areas sown with different agricultural crops: the use of manganic superphosphate on sugar beets provides an additional root harvest of 11.7-17.6 quintals/hectare and application of this fertilizer on soil low in manganese produces an additional 27.1-44.0 quintals per hectare; the harvest of grain increases by 1.1-2.0 quintals per hectare.

Since 1970 the Vinnitsa Chemical Plant has been producing borate superphosphate. This is a highly effective fertilizer, especially when used on sugar beets, flax, hops, and other industrial crops. Today the plant has an annual output of about 200,000 tons of superphosphate with boron in the form of boric acid. The economic effect from the use of this fertilizer on sugar beet crops is about 14 million rubles per year.

Further increases in the production of this fertilizer are being held up by the limited quantity of boric acid that can be allocated to meet the needs of agriculture, even though the annual demand for fertilizers containing boron in the UkSSR alone is 800,000 tons. In connection with this the Plant Physiology Institute of the UkSSR Academy of Sciences has done a great deal of work to seek out and study other types of boron-containing raw materials. For example, calcium borates have been studied extensively, tested, and recommended as boric supplements to basic fertilizers. They have turned out to be just as effective as boric acid. The UkSSR State Planning Committee has also received a proposal for producing nitroammophos with boron at the Rovno "Azot" [Nitrogen] Production Association using calcium borates. Work is continuing on the study of other types of boric raw materials that could be used in fertilizers for agricultural crops.

The Microelements Department developed a method for pre-sowing enrichment of seeds with microelement salts and proposed the use of this method in production. By increasing growth activity and intensifying the formation of vitamins and phytohormones, this method helps increase the plant's productivity. Pre-sowing enrichment of seeds increases the yield of corn by 2.7-3.0 quintals/hectare, the yield of winter wheat by 3.2 quintals per hectare, and the yield of sugar beets by 20.7-24.0 quintals/hectare.

The Odessa Superphosphate Plant has built a shop for the production of preparations containing boron, zinc, molybdenum, and copper. However, the pre-sowing enrichment method has been used most widely at corn calibration

plants, where about 50,000 tons of hybrid seed corn are treated with microelement salts annually; this is practically enough for the entire area sown with this crop. According to calculations made by the Ukrainian Agricultural Economics Scientific Research Institute imeni A. G. Shlikhter, the annual economic effect from using this method is 12 million rubles.

Associates of the institute have made a great contribution to the study of the biological role of copper fertilizers in the life of plants. Their proposals formed the foundation for measures to provide copper fertilizers to kolkhozes and sovkhozes with drained lands. Recommendations have also been developed for the use of fertilizers containing molybdenum on bean crops, and lithium fertilizers on potatoes and tomatoes. Proposals for the manufacture and use of these fertilizers have been submitted to the departments concerned.

The Plant Physiology Institute of the UkSSR Academy of Sciences is the only institution in the republic that has surveyed the primary tracts of arable soil in the Ukrainian SSR in terms of their content of labile forms of the microelements manganese, boron, zinc, molybdenum, copper, and cobalt. The institute printed 10,000 copies of the cartogram and sent them to all the republic, oblast, and rayon agricultural agencies along with recommendations for the use of micro-fertilizers depending on the soil conditions. Twenty years have passed since then, and these materials are the only support for agricultural departments in their planning of supplies and use of fertilizers with microelements.

A study of the reasons for chlorosis in fruit crops in a number of oblasts in the UkSSR showed that this functional disease was caused by a significant weakening of the photosynthesis activity of leaves as a result of a shortage of mobile forms of iron in carbonate soils. On the basis of research that has been conducted, a method was developed for using complex compounds of iron to rid fruit trees and grapevines of this disease. Superficial supplemental fertilization of fruit trees with a 0.10-0.15 percent solution of Fe-DTPA and Fe-PPPA (iron diethyltriamine pentacetate and iron polyethylpolyamine polyacetate) raises the chlorophyll content of leaves by a factor of 4-5 and increases the annual growth of plants, which helps increase the fruit yield by a factor of 2-3. Work done in cooperation with the All-Union Chemical Reagents and Ultrapure Chemical Substances Scientific Research Institute and other scientific research institutions that use complexonates in many sectors of the national economy, was awarded the USSR State Prize. This method is currently being introduced at sovkhozes in the Crimean, Zaporozhye, and other oblasts, and it is being used widely by amateur horticulturists, for whom iron complexonates are produced in small packages under the name "antichlorosin."

A great deal of attention is given in the institute's research to problems involving the physiology of providing plants with microelements, specifically potassium, nitrogen, and sulfur. On the basis of a study of the physiological role of potassium, it was possible to develop a system for providing grapevines with potassium, which makes it possible to increase the yield of grapes significantly, as well as their sugar content. This system has been tested successfully at various vineyards in the Georgian SSR.

It has been determined that the use of late supplemental fertilizers containing nitrogen applied superficially to wheat leads to a marked increase in the grain's protein content. Two applications of the fertilizer on winter wheat that is being irrigated with carbamide, during the ear formation phase and the milk ripening phase, provide good results. The yield of grain is 15 percent higher, the gluten content can reach 40 percent, and the hyalinity reaches 90 percent.

In conjunction with the Nikolayevsk Oblast Agricultural Testing Station, a process for supplying winter wheat with nitrogen has been developed and has undergone extensive practical testing; it makes it possible to grow large harvests of better-quality wheat under irrigation conditions. This process was part of the recommendations for growing programmed harvests of winter wheat under irrigation and it was included in the 1983 plan of the UkSSR Ministry of Agriculture for incorporating scientific achievements into production.

Considering the expanding role of selection, the institute is devoting attention to research that will help optimize the selection process; in particular, it is studying the possibility of developing methods that will aid selection specialists in breeding wheat for protein at the first stages of the selection process. In conjunction with the UkSSR Nuclear Research Institute, a rapid nuclear method was developed for determining protein in wheat kernels and a semiautomatic device was created that can produce several thousand analyses per day. In 1982, with the help of this method, over 12,000 samples of wheat were analyzed for the plant breeding specialists at the Ukrainian Irrigation Farming Scientific Research Institute, and for other plant breeding institutions. The correlation coefficient between the data obtained using the device and the data obtained through traditional biochemical analyses is quite high.

According to a decree issued by directive agencies of the UkSSR, this method should be used by all plant breeding institutions engaged in wheat selection.

For many years the institute has been studying the formation of the cell wall in cereals under the influence of various chemicals. As a result of this research, the institute and several other scientific research institutions submitted a proposal to the UkSSR Ministry of Agriculture on the use of chlorcholine chloride to prevent lodging of winter wheat. Over recent years this method has been used extensively on fields of the republic's kolkhozes and sovkhozes. The economic effect from the use of this method in the forest-steppe and woodlands regions of the UkSSR alone is more than 4 million rubles a year.

The institute is devoting a great deal of attention to the study of biologically active substances. Research is being done on growth activators, retardants, inhibitors, and herbicides. As a result of research on the mechanism of action of the growth inhibitor hydrazide maleic acid (HMA) on plants, it was discovered that it is very effective for improving the storage properties of a number of agricultural crops. With the help of pre-harvest application of HMA, the sugar content of the sugar beet root can be increased and the yield of sugar per hectare can be increased by 50-250 kg. This method is undergoing extensive practical testing. Currently sugar plants in the

Ukraine are using a method developed by the Plant Physiology Institute of the UkSSR Academy of Sciences and the All-Union Sugar Industry Scientific Research Institute for improving the storage of industrial sugar beet roots by treating them with a sodium salt of HMA while they are being poured into piles. The economic effect obtained from this method is about 300,000 rubles per year. Furthermore, the use of HMA makes it possible to improve the quality of the mother beet and to mechanize labor-intensive processes, such as using pincers to dig up sugar beets.

This method was developed in cooperation with the All-Union Sugar Beet Scientific Research Institute and is now being used in the UkSSR over an area of more than 20,000 hectares annually.

A method has been developed for using HMA in the battle against tobacco parasite. It is very simple (it is applied to seedlings in a solution), it requires minimal expenditures, and it makes it possible to eliminate this persistent quarantinable weed almost entirely.

The institute devotes special attention to studying the mechanism of action of various groups of herbicides and to problems in their practical use, taking into account the exceptional importance of resolving these questions. A special department was created for studying the physiology of action of herbicides; the work of this department is making a major contribution to organizing and introducing chemical methods for combatting weeds in the Ukraine and other republics. Associates of this department are primary consultants of the UkSSR Ministry of Agriculture on questions involving the order, supply, and use of herbicides during the sowing and planting of practically all agricultural crops. Of special importance is the work being done to study the combined use of herbicides, which makes it possible to destroy weeds more effectively with smaller quantities of herbicides, many of which are imported and in very short supply. The department developed and included in recommendations on the chemical campaign against weeds a whole series of compound herbicide preparations for use on corn, sugar beets, flax, sunflowers, and many vegetable crops. Together with other scientific research institutions the institute did a great deal of work to study the possibilities for chemical elimination of the destructive pink bitterweed.

Extensive research is being carried out on the specific breeding of various agricultural crops in areas where the land has been drained. Many years of stationary tests were used to study questions of nutrients and water conditions, and the time periods and methods for planting major field and feed crops in deep drained peat bogs. The results of this research made it possible to develop methods for obtaining high yields of these crops in peat bogs, which is a fairly complicated task. In recent years this process has been introduced extensively at kolkhozes and sovkhozes in Volyn Oblast that have large areas of drained lands. This has made it possible for the farms to bring about a signficant increase in the yield from drained peat bogs. The economic effect in Kovelskiy rayon alone in 1982 was 1.6 million rubles.

With the aim of providing assistance to indoor vegetable farming in the republic, the Plant Physiology Institute of the UkSSR Academy of Sciences organized coordinated research on the conditions of growing vegetables in

hothouses. The study of gas conditions in hothouses made it possible to develop a system for gas regulation. In cooperation with associates of the Physical Chemistry Institute of the UkSSR Academy of Sciences, the institute developed a method for providing carbon dioxide to hothouse plants by using waste gases from their own boilers. This method makes it possible to increase significantly the yield of cucumbers and tomatoes; it is less expensive and more hygienic than direct burning of gas in the hothouse or the use of carbon dioxide in cylinders; it also reduces gas pollution of the environment, since before entering the hothouse the waste gases pass through a catalyst that removes carbon oxides and other harmful impurities. This proposal is being introduced successfully at the "Kiyevskay ovoshchnaya fabrika" [Kiev Vegetable Factory] sovkhoz and other hothouse farms. Using this method, the Kiev Vegetable Factory sovkhoz alone provides Kiev residents with additional vegetables valued at 400,000-500,000 rubles annually.

The many years of research on the possibility of overcoming incompatibility of plant tissues by means of nuclear radiation has met with success. A radiation method has been developed for treating graft components of grapevines with the aim of overcoming tissue incompatibility between the graft and the stock. The use of this method makes it possible to increase the yield of saplings. Another important problem was resolved at the same time--manual or mechanical operations to "blind" grapevine grafts can be replaced by treating the middle part of the graft with gamma rays. Work on introducing this new technology is being done in cooperation with the "Viyerul" Scientific Production Association in the Moldavian SSR.

Other proposals have been developed and are being prepared for presentation to the appropriate departments, such as industrial production and use of nitrosammophos with boron, treating tomatoes with etrol to speed up their ripening, using dimethylsulfoxide to increase the productivity of sugar beets and potatoes, producing new herbicide compounds, and so on.

The organization of extensive practical testing is a guarantee of the success of work being done for broad incorporation of promising proposals. Confidence in the accuracy of results of primary tests, information on similar work in this country and abroad, and sound knowledge of the possible sources of raw materials, if the question involves production of fertilizers or preparations--all these are necessary conditions for successful incorporation of developments into production. The institute's administration and the researchers themselves are seeking out ways to accelerate this process. Permanent contacts are established and maintained with the appropriate departments; this involves official correspondence, meetings, joint work on economic agreements, and so on. When necessary the institute performs demonstration experiments at farms under the departments concerned with the aim of familiarizing as many specialists as possible with the results. Utilization

of all these opportunities makes it possible to provide a maximum reduction in the amount of time required to put research results into practical use in agricultural production.

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EFFECTIVE AND WISE USE OF CHEMICALS IN AGRICULTURE--IMPLEMENTATION OF FOOD PROGRAM

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 pp 2-6

[Article by N. F. Tatarchuk, chairman of All-Union Scientific Production Association for Agrochemical Servicing of Agriculture, deputy USSR Minister of Health]

[Text] One of the central tasks to implement the Food Program is to succeed in development of agricultural production based on mechanization, use of chemicals, land reclamation and further refinement of economic relations between agriculture and other sectors of the economy. The steps taken by the party and state, as well as selfless labor of workers in the agroindustrial complex, have had a beneficial effect on the indicators for last year. Almost 134 billion rubles' worth agricultural products have been obtained, which is 5% more than in 1982. A rather good grain harvest has been reaped; many republics, krays and oblasts have fulfilled the plans for its sale; there has been an increase in procurement of feed; sugar beet, potato, cotton and long-stemmed flax harvests have increased. There have been positive changes in livestock farming. The economics of kolkhozes and sovkhozes has strengthened significantly.

The workers of enterprises and organizations under Soyuzsel'khozkhimiya [All-Union Scientific Production Association for Agrochemical Servicing of Agriculture] made a significant contribution to these achievements. In the nation as a whole, 1125 million tons of organic fertilizers were delivered to the fields, which is 8% more than in 1982; the plan for 3 of the 5 years of the current Five-Year Plan was fulfilled with regard to delivery of organic fertilizers, while use of peat for fertilizer increased by 19%. Plans for delivery into soil of organic and mineral fertilizers were overfulfilled, and 6% more were delivered to grain crops than in 1982. For the first time, plans were fulfilled for lime and gypsum treatment of soil; the volume of work for the protection of plants increased.

The work and services plan of Soyuzsel'khozkhimiya was 117% fulfilled, and their volume increased by 10.5%, as compared to 1982.

The objective spelled out by the December (1983) Plenum of the CPSU Central Committee for the fourth year of the Five-Year Plan was to raise a large harvest of agricultural crops, persistently increase utilization of the potential created in agriculture, effectiveness of using chemicals and other

resources assigned for development of the agroindustrial complex. Achievement of this objective depends largely on a unified agrichemical service, manned by more than half a million blue-collar workers, technicians, agronomists, engineers, scientists and white-collar workers.

The Soyuzsel'khozkhimiya Association, which was founded 4 years ago, is now a major sector, an important element of the agroindustrial complex, and the high demands made of it are fully justified: to comprehensively increase the effectiveness of its work, achieve not only the planned indicators but, and this is the main thing, a high end result.

Responsibility for the harvest, for overfulfillment of plans for production and sale to the state of agricultural products--this is what presently determines the evaluation of the contribution of each department, each team in our association, including the State Plant Protection Service, which is part of Soyuzsel'khozkhimiya.

Without systematic and effective control of pests, plant diseases and weeds, a considerable part of the harvest could be lost. With intensification of agriculture, the danger of loss not only does not dimish but, on the contrary, it increases. Land reclamation and use of chemicals on the fields, concentration and specialization of production, introduction of industrial technologies for raising agricultural crops and zonal systems of farming--these and many other extremely important reserves for fulfilling the USSR Food Program are based on refinement of protective measures.

It is not by chance that, V. K. Mesyats, USSR minister of agriculture, in a speech to administrative personnel of the Plant Protection Service and students of the Higher School of Agricultural Management, stressed the particular responsibility of those dealing with plant protection for the fate of harvests, and spoke firmly about further strengthening of the plant-health service, attributing much importance to it.

Last year, more than 166 million ha of crops and plantations were treated against pests, diseases and weeds; defoliation and desiccation of 5 million ha were performed. For these purposes, a total of 1.5 billion rubles was spent, while the savings in production constituted almost 6 times more than the expenses. This year, we have every opportunity to provide for an even higher economic effect from plant protection.

The Plant Protection Service of the Soyuzsel'khozkhimiya Association, which is comprised of 15 administrations, 154 republic, kray, oblast plant protection stations and 1869 rayon and interrayon plant protection stations, 166 laboratories for forecasts and diagnoses, 1518 centers for reporting and forecasting. There are 108 toxicological testing laboratories, 42 phytohelminthological laboratories, 30 specialized expeditions and detachments that help conduct the work on a modern level. There are more than 3000 mechanized groups of Sel'khozkhimiya, that are directly involved in work to protect plants on the basis of contracts with kolkhozes and sovkhozes.

When speaking of the modern level, I have in mind primarily organization of measures in such a way as to achieve reliable preservation of harvests, minimal

labor, material-technical and monetary expenditures and not cause detriment to the environment.

The principles of integrated protection meet these requirements. They include control of a number of harmful organisms only to the extent that this is necessary to preclude losses that would exceed in cost the expenses for phytosanitary measures.

Scientifically validated combined systems of measures have been developed and are used to protect cereal crops, corn, rice, sugar beets, cotton, potatoes, long-stemmed flax, leguminous, oil-bearing crops, Cucurbitaceae, fruit, grapes, tobacco, clover and alfalfa, rape and field cabbage, hemp, protective tree stands and tree nurseries. They provide for maximum use of agrotechnical and other preventive measures to prevent mass-scale development of pests, diseases and weeds, as well as broad introduction of resistant cultivars, the biological method, wise and efficient use of pesticides with due consideration of economic thresholds of harm of different species.

The approach to plant protection as wise control of number of pests implies, of course, that concern about the phytosanitary condition of cultivars is manifested throughout the period of raising farm crops, and it is implemented primarily by sophisticated agrotechnology, differentiated choice of the required means of control for each field and even parts of fields, with consideration of the constantly incoming reliable information about extent of infection with diseases, intensity of build-up in number of pests or weeds, as well as presence of beneficial entomofauna. This means that integrated protection of harvests is the affair primarily of the farm that raises them. For this purpose, most kolkhozes and sovkhozes have the necessary base, with functioning specialized brigades and units for plant protection that are furnished with the necessary equipment; pesticide warehouses, solution centers and treatment areas have been constructed. Work dealing with plant protection is included in the financial and production plans of kolkhozes and sovkhozes, as well as technological maps. The brigades that operate on the basis of a collective contract work particularly well, making use of the best and most economical procedures to protect harvests.

However, only highly skilled specialists are capable of using the entire set of protective measures on a modern level. There are more than 13,000 agronomists specializing in plant protection working in our nation's farms. The USSR Ministry of Agriculture considers that this is not enough. The recommendation was made to administrators of sovkhozes and kolkhozes (particularly those engaged in intensive farming) to add the position of plant protection workers, increasing the responsibility of this category of specialists for careful, efficient and economical use of the set of special measures and agents.

Such formulation of the matter by no means minimizes the responsibility of Sel'khozkhimiya associations and their stations for plant protection, with respect to organization and implementation of measures to control pests, diseases and weeds. It has been established that complete responsibility has been placed upon the All-Union Scientific Production Sel'khozkhimiya Association for both building up field fertility and assuring preservation of harvests, no matter who performs this work (the farms themselves, Sel'khozkhimiya units or agricultural aviation units).

Even now, we expect plant protection stations not only to offer methodological assistance to farms in organizing special work, implementing state control over its performance, but to directly organize such work and offer technological supervision. I should like to call attention to the large-scale production experiment dealing with introduction of combined agrochemical servicing of farms (which was discussed in the first issue of this journal). According to the contract concluded between the farm and rayon association, there was clearcut definition of the duties of each side, both with regard to increasing fertility of the fields and their reliable protection against damage by pests, diseases and overgrowing with weeds. I think that this form of work provides wide latitude for interaction between farm workers and the agrochemical service both in raising a large harvest and in using integrated systems of plant protection. In particular, this makes it also possible to solve problems of greater concern to agrochemists (including specialists in plant protection) about the end result--gross output, its quality, lowering cost, etc.

The fact that the plant protection service belongs to Sel'khozkhimiya by no means should signify that only chemicals remain in the arsenal of methods for controlling loss of harvest. As we have already stated, the farms' obligation to adhere to all the necessary agrotechnical procedures instrumental in improving crops and plantations, to practice farming on a high level, raise highly productive cultivars resistant to diseases and pests is the basis of concluded agreements.

Decisive steps are being taken to replace chemical treatment with biological treatment. A total of 1358 biological laboratories and biological plants have been established in the country and are in operation (there were 656 in 1979); the number of mechanized Trichogramma production lines has grown from 179 to 590. Each of these lines can provide Trichogramma for 30,000 ha of crops, the standard delivery rate being 80,000 specimens/ha. Other entomophages are also used extensively: Habrobracon, Pseudoficus, allotropa prospaltella, the phytophage phytomise, the products bactorodencid, dendrobacillin, bitoxybacillin, entobacterin. Equipment is being developed and tested for long-term storage of Trichogramma, which would permit year-round breeding of egg parasites in laboratories and factories. Various designs are being developed of equipment for delivering Trichogramma to the field, both ground- and air-borne.

Increasing use is being made of biologicals on protected soil. Here, the predatory mite, Phytoseiulus, and the biologicals, verticillin, trichodermin and bactorodencid are in first place; the breeding and use of other parasites, predators and pathogens are being adopted, in particular, Ashersonia against the white fly; inoculation of tomatoes against tobacco mosaic has yielded good results. In all, the biological method was used on almost 22 million ha in 1983. A total of 58.5 million m^2 area of closed ground was treated with such agents.

Integrated systems are being used with skill in Uzbek SSR. Use of the biological method there has grown from 447,200 ha in 1976 to 2.8 million ha in 1982. This means that almost 40% of all cotton fields are protected in that republic by biological, rather than chemical agents. As a result, use of highly toxic pesticides was reduced from 56,900 tons in 1976 to 33,900 tons in 1982.

In the same period, expenses to control cotton pests dropped from 24.6 to 18.9 rubles/hectare. Biological agents are used with competence in Krasnodar Kray, Sverdlovsk Oblast, Tatar ASSR, Kharkov, Cherkassy and Nikolayev oblasts. These indicators could have been even higher if the farms and associations had had a wider assortment of biologicals and they had been delivered in sufficient quantities, and if they had been of a high quality. Unfortunately, entobacterin, dendrobacillin, bitoxibacillin and lepidocid do not have adequate wetting and adhesive properties, and they suspend poorly. Their guaranteed shelf life is short, so that they lose their efficacy by the following year's season. Yet the wholesale prices of these agents are high.

With reference to improvement of the chemical method, we should like to stress, first of all, the role of development and consideration of economic threshold of deleteriousness of harvest pests, increase in reliability of forecasts of appearance of pests and diseases, refinement and simplification of methods of inspection and record-keeping on number of pests. It is difficult to exaggerate here the significance of pheromone traps, which are being used more and more. This makes it possible to determine the most effective time for treatment or (when the pest population is below the threshold level) cancellation of such treatment. At the present time, pheromones are used to keep records on number of codling moths, European grape moths, Oriental moths and click beetles. Last year, more than 600,000 traps were delivered.

Competent use is being made of pesticides in the progressive detachments of Sel'khozkhimiya and farms, using them only in areas where a threat to harvest was identified, at the recommended times on a tight schedule, in accordance with established regulations. Such optimum and economical procedures as combined treatment (when a unit delivers two or several agents with different action in a single pass), small-volume and ultrasmall-volume spraying, which increases by 1.5-2 times the productivity of labor of chemical specialists, application of herbicides on tape, spraying insecticides along perimeters, etc. The network of toxicological inspection laboratories is expanding; thanks to them it is possible to promptly detect instances of poor preparation of solutions, poor spraying, treatment of seeds, and to discard agents that do not conform to standard requirements.

Simultaneous performance of agrotechnical and chemical measures is a progressive direction (for example, sowing or cultivation combined with delivery of herbicides). Such practices are of particular value in delivering volatile herbicides, which are used on cord being raised by industrial technology: delivery of herbicides into soil increases appreciably the efficacy and profitability of work, avoiding loss of expensive chemicals.

With each year, the Sel'khozkhimiya associations are increasing the volume of work that is performed by mechanized units. In 1983, this applied to about 13% of a total of 171 million ha. Of course, this indicator will rise. It is necessary to furnish the detachments for production services with sprayers, tanks and transportation at a faster pace, as well as to build warehouses and garages faster. However, the ultimate decision as to whether to use machine operators from Sel'khozkhimiya or have their own operators for chemical protection of fields and plantations (for each farm, or on an interfarm basis) is up to the kolkhozes and sovkhozes. This is not the place for management.

The only arguments in favor of using detachments could be the high quality of their performance, efficiency, ability to interact usefully with allied farm departments and, of course, a real economic return, increment in harvest, reduced production cost, etc.

But a service such as being a middleman between farms and agricultural aviation requires introduction everywhere. The experience gained by rayon Sel'khozkhimiya associations in Lithuania, Kirghizia, some oblasts of the RSFSR and other republics indicates that it is possible to perform the cycle of jobs with fewer machines in those places where aviation services are well-organized, where landing strips are being built for this purpose (or are acquired), as well as warehouses, tanking-up centers, hotels and public buildings for flight personnel, where aircraft and helicopters do not stand idle for organizational reasons.

Unfortunately, in some locations, the Sel'khozkhimiya associations disassociate themselves from this work. This must end. Already under the current Five-Year Plan, all the opportunities exist to organize an airport service in most regions and farms that make use of airborne chemical spraying.

In analyzing the work on organization of plant protection in 1983, we should mention the performance of plant protection stations and of the Sel'khozkhimiya associations as a whole in Krasnodar Kray, Volgograd, Bryansk, Cherkassy, Rovno, Kharkov, Kustanay and Ural oblasts, Lithuania and Moldavia, which competently organized introduction of industrial technologies. At the same time, there are also some serious claims against specialists in plant protection.

There was grain damage by the chinch bug in several oblasts of the Central Chernozem region. The chief cause of this was delayed treatment against this pest. Harvest loss was sustained in Yaroslavl, Smolensk and Kzyl-Orda oblasts. There have also been instances of infraction of the rules for use of pesticides, and their storage in unsuitable buildings. This is the direct oversight of plant protection stations.

Special mention should be made of seed treatment. In 1982, this matter was the subject of discussion at the board meeting of the USSR Ministry of Agriculture, but the proper conclusions were not drawn from the criticism in several oblasts. Last year, grain stricken by smut was delivered to grain receiving centers again in Penza, Tambov, Kursk, Voronezh and other oblasts, which is indicative of poor organization of seed treatment. Individuals answerable for performance of this work must be held very strictly responsible for this, we cannot tolerate such an offhand attitude toward the job!

Among the serious oversights, we should also mention the fact that work on making maps of fields with regard to weeds is still not being done at all kolkhozes and sovkhozes. This lowers drastically the efficacy of using herbicides.

Quite a few complaints are received that the plant protection stations are not fully provided with transportation, laboratory and other equipment and materials, funds for capital construction, housing, and questions of bonuses for good performance have not been settled. In a number of areas, specialists in plant

protection are diverted from their job for extraneous work unrelated to their immediate duties, to the detriment of the cause.

An order was issued for Soyuzsel'khozkhimiya, which provides for solutions of some of these problems. The purpose of this order is primarily to improve the efficiency of performance of plant protection stations, particularly on the rayon level.

The Sel'khozkhimiya associations of Union republics must increase the authority of administrators of plant protection stations, take steps to strengthen the rayon-level facilities, establish rayon plant protection stations instead of interrayon ones, organize reporting and forecasting centers in each administrative region, provide them with transport and man them with qualified personnel.

It is stressed in this order that the duties and tasks of plant protection stations are spelled out in the USSR by the Statute on Plant Protection. It is forbidden to divert the specialists of this service to perform work that is unrelated to protection of plants against pests, diseases and weeds.

There are provisions to furnish the plant protection stations with material and technical resources, transportation, funds for capital construction and housing under equal conditions by other departments of the agrochemical service also.

The distribution of these resources is a job for plant protection stations for the purpose of correct, wise and efficient use of chemical and biological agents for plant protection, as well as equipment for their delivery.

Matters of scientific and methodological supervision of the work of plant protection stations, reporting and forecasting centers, toxicological inspection laboratories and other departments have been settled.

Comrade K. U. Chernenko stressed at the February (1984) Plenum of the CPSU Central Committee: "Intensification, speedy introduction to production of the achievements of science and technology, implementation of major integrated programs--all this should ultimately advance the productive forces of our society to a qualitatively new level." It is imperative to constantly build up the efforts of workers in the agroindustrial complex toward fulfilling the USSR Food Program, increasing yield from fields and livestock productivity. It is the duty of the Soyuzsel'khozkhimiya Association to perform its work in such a way as to have each kilogram of fertilizers, pesticides, biological agents yield a maximum return and result in recovery of large harvests of excellent quality.

At the USSR Exhibition of Achievements of the National Economy

The seminar of deputy chairmen, heads of the board of production services of republic, kray and oblast Sel'khozkhimiya associations, which convened in Moscow in February, was concerned with means of augmenting the effectiveness of agrochemical services to kolkhozes and sovkhozes. V. L. Zakharov, vice-chairman of the Soyuzsel'khozkhimiya Association delivered a report. The

participants at the seminar discussed problems of upgrading agrochemical services in 1984. Among the first and foremost tasks to perform, they also mention expansion of services dealing w th use of herbicides, treatment of seeds and servicing agricultural aviation.

PHOTO CAPTIONS

p 2. In Moldavia, cultivation of corn using industrial technology is expanding. Herbicides are delivered into soil that has been leveled and fertilized well; they are delivered and sowing is performed immediately. Photo shows sowing complex in operation at kolkhoz imeni Kalinin in Kaushanskiy Rayon. Photo by A. Grin'ko (TASS photographic records).

p 3. Pesticides used to spray winter wheat at kolkhoz imeni Kirov, Korenovskiy Rayon, Krasnodar Kray. Photo by Ye. Shulepova (TASS photographic records).

p 4. Early spring treatment of orchard.

p 5. Chemical weeding of rice.

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AIRFIELDS OF LITHUANIAN AGRICULTURAL CHEMICALS ASSOCIATION

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 pp 7-8

[Article by Yu. N. Neypert]

[Text] The inception of the agrochemical service did not occur in a single year. And it is not surprising that by far not all forms of services can be offered to their customers by the rayon Sel'khozkhimiya [agrochemicals] associations and their enterprises, which were formed only 4 years ago. It will take time for the new and important element of the nation's agroindustrial complex to acquire all that it needs (material and technical base, qualified personnel, experience) to fully meet the demands of kolkhozes and sovkhozes.

Under such conditions, it is extremely important for agrochemists to concentrate their main attention on projects that would, on the one hand, be of utmost importance to the agroindustrial association of a given region and, on the other hand, could be performed well and efficiently without any serious additional monetary investment and allocation of fund materials.

Of course, this problem is being solved in its own way in each republic, oblast and rayon.

M. V. Slaboshchavichus, chief of the board of production services of the Litsel'khozkhimiya [Lithuanian Agrochemicals] Association, states: "From the very first days of formation of Sel'khozkhimiya in Lithuania it was decided to centralize airborne chemical treatment work and to assume the role of middleman between the farms and aviation enterprises." Aviation is used extensively in our republic. This makes it possible to deliver fertilizers and pesticides on a tight schedule and over large areas, lowering the intensity of spring, summer and fall field work at kolkhozes and sovkhozes. The high output and low volume of labor of airborne delivery of agents are attractive.

However, in the past, many of these advantages of airborne treatment were canceled out by "ground-based" organizational problems. The aviation departments concluded agreements with each kolkhoz and sovkhoz individually, and at each of them it was necessary to find and equip landing strips, acquire treatment equipment and train servicing personnel. The brigades that were hastily formed, for a few days, were not outstanding, of course, with respect to either coordination of work or firm knowledge of the rules for handling

pesticides. The aircraft stood idle due to lack of coordination of actions by ground-based and aviation services, and conflicts arose with pilots.

At present, the aviation departments in Lithuania deal with a single partner, Sel'khozkhimiya. In turn, the rayon-level associations conclude agreements with farms, determine the order of field treatment and settle accounts with aviators. There are detachments in each rayon association for aircraft and helicopter servicing, which are equipped with transport, tractors and equipment for preparing working solutions of chemicals.

During the period of application of pesticides and fertilizers, up to 80 aircraft and 4-6 helicopters work at the same time in this republic. The Litsel'khozkhimiya Association, together with aviators and this republic's Institute of Land Management made estimates of optimum location of agricultural airports, so that the range of flights to treated fields would not exceed 5-7 km. For the time being, most airports have ground-covered fields, but intensive work is in progress on paved landing strips. As a rule, warehouses with fertilizers and pesticides, hotels for flight personnel and public buildings are located nearby. There are already 98 agricultural airports with hard surfaces, and 35 of them have been taken over as resources of rayon associations.

In 1982, airborne delivery of chemicals in Lithuania, with Sel'khozkhimiya as the intermediary, covered an area of 1.2 million ha, including 360,000 ha treated against pests, plant diseases and weeds. By the end of the current Five-Year Plan period, 500,000 ha will be treated with pesticides from aircraft.

In Radvilishkskiy Rayon airborne chemicals are used on 80,000-90,000 ha per year, including herbicides on abut 20,000 ha. There are 28 farms (out of 29) that use the services of aviators. There are airports at 20 of them.

Is this a lot or too little?

"We use aircraft to apply fertilizers and pesticides, and not to haul them," states R. Valatka, chairman of the rayon association. "We consider it economically expedient to have enough runways so that the range to treated areas would not exceed 5 km. Of course, this does not mean that permanent facilities will be constructed everywhere. Some of the runways will be temporary. But we already have four airports with hard-surface runways and three more are under construction. A center is being organized to service aircraft, and this will make it unnecessary for winged craft to make regular flights to the central base for maintenance and regular inspections."

A special mechanized detachment headed by L. Yasinskas was established to service aircraft. The detachment consists of eight tractor operators, one tank truck driver and four guards. In the rayon, 3-4 aircraft are used simultaneously (maximum is 8), and the detachment sends out machine operators with the necessary equipment to each aircraft. As a rule, one tractor operator from Sel'khozkhimiya can handle loading of the aircraft for delivery of fertilizers, and two work on chemical weeding (one delivers water). There is an agronomist specializing in plant protection of the farm in attendance

at the airport, who sees to it that established procedures are followed, coordinates the work of pilots, agrochemists and signalers.

Fields of grain crops are treated with the agent, tur, herbicides and fundozol for the control of root rot by means of airborne dusting in this rayon. The work is done not only in the spring and summer, but also in the fall.

The farms and rayon agrochemical association are concerned with having the same crews work in Radvilishkis, providing the necessary conditions for them and commending their productive performance. The crews of A. Mokin, V. Ivanov, I. Vashkyalis and Yu. Nikolayev are mentioned among "their own" pilots. In a few years, they learned well about the local conditions, established the necessary contact with specialists and machine operators. This is instrumental in increasing labor productivity, and it rules out flaws and having equipment stand unused.

But there are also unsolved problems. The work is suffering from the fact that the Lithuanian associations do not have their own warehouses for pesticides, and they are compelled to use those of the farms. Not infrequently, one finds stacks of barrels and sacks assembled separately from one another near a parked aircraft, which means that farms have delivered "their own" chemicals, to be used only on "their own" fields.

Is it not strange that Sel'khozkhimiya delivers chemicals on a centralized basis to kolkhozes and sovkhozes, obtains a receipt from them and a few days or weeks later the same products are transported back to the association.

Superfluous transport of supplies, problems with accounting, confusion about the age of leftovers--all this would not occur if the detachment for aircraft servicing would have a centralized supply of chemicals for plant protection to take care of the entire area to be treated, as stipulated in the contracts, while the farm would be sent a bill for products used on its fields, along with the bill for intermediary services related to airborne delivery of chemicals. But to do this, they must have their own warehouses, and they must be built faster. This is already being done in some rayons.

Incidentally, let us say a few words about the accounts. The estimates for work performed by the airport service of Sel'khozkhimiya that are in effect in this republic have been so prepared that they do not even cover the expenses of the enterprises proper. Losses are a poor incentive for development of a valuable idea and, apparently, the rayon agroindustrial associations should have approval of prices, with consideration of local conditions, for servicing aircraft that would be advantageous for both the farms and Sel'khozkhimiya.

PHOTO CAPTIONS

p 7. Airport of Artoyas Kolkhoz, Panevezhskiy Rayon.

p 8. Left: A good chemical center was built by the experimental farm of the Lithuanian Scientific Research Institute of Agriculture: storerooms for mineral fertilizers and pesticides, runway with hard surface; next to them a mechanized treatment center with bins for storage of

p 8. [continued] treated seeds. A center for preparing working solutions of pesticides and settling tanks for liquid waste are under construction. Photo shows building for flight and agronomy personnel, with offices, sleeping quarters and public rooms.

Right: Warehouses for fertilizers and pesticides under construction near the tracks next to runway of the Rayon Sel'khozkhimiya Association (in Sheduva) in Radvilishkskiy Rayon.

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10,657
CSO: 1840/1048

UDC: 632.915:632.982.4

EFFICIENCY OF GROUP BASES FOR AIRBORNE CROP DUSTING

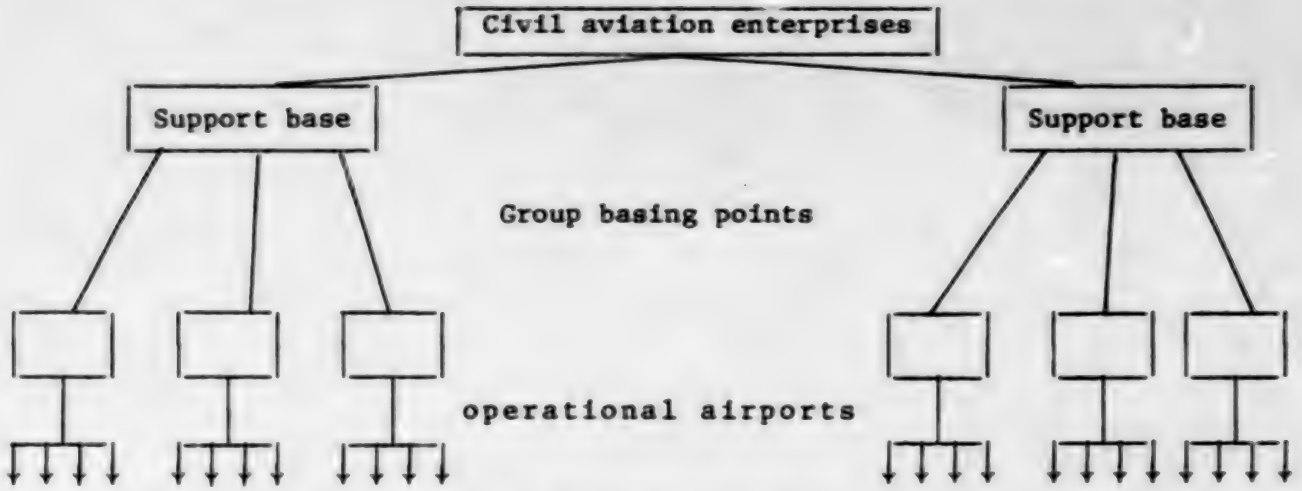
Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 pp 9-10

[Article by V. A. Kharchenko, chief of sector for organization of production and control, VNIIPANKh GA (expansion unknown)]

[Text] The work of aviation in agriculture is quite specific. The spatial distance between airports, diversity of technological operations and substantial reliance of production processes on weather--all this lends special importance to organization of control of airborne work with chemicals. Group basing of aviation equipment, which is practiced extensively in Azerbaijan, is largely instrumental in solving the problem. This form of control (see Diagram) makes it possible to avoid excessive centralization, discuss many problems on the spot, promptly inform executors of their assignments, check their performance and quality, receive and systematize information rapidly concerning work that has been done.

Concentrating aircraft, fuel and lubricants, spare parts and equipment and other technical items at the point of a group base makes it possible to improve organization and preparation of airborne work, monitor safety of flights, schedule aircraft and provide for their upkeep locally. By assembling the crews of the entire aircraft unit at the site of the group base facilitates dissemination of political information, reports, conversations with flight personnel, discussion of flights and immediate tasks.

This is how the airborne crop dusting work is managed, for example, in Agdzhabedinskiy Rayon, Azerbaijan SSR. The group base is linked with 18 functional airports, from which crop dusting work is done for 24 farms. There are daily reports on results of flights, evaluations of quality of preparing for them, organization of work at operational airports, with analysis of economic indicators, disclosure of flaws and indications of means of eliminating them. There is centralized servicing (fuel and lubricants) of aircraft at the group base, which facilitates record-keeping on use of such supplies. A repair vehicle is sent to crews that have requested technical assistance, and this reduces to a minimum the number of nonproductive flying hours to render assistance at operational airports. Good living conditions were provided at the group base for technical flight and service personnel. There are a dormitory, lounge and dining room there. Medical care of crews was organized.



Structure of control with group basing of aviation equipment

	Pest and disease control				Weed control				Cotton plant defoliation			
	at following rates of delivery of chemicals (liters/hectare)											
	50	100	50	100	25	50	25	50	50	100	50	100
	1981		1982		1981		1982		1981		1982	
Treated area (thous. ha)	319.8	1146.0	360.6	908.6	86.2	234.5	207.1	133.8	2.3	432.1	4.3	486.7
Aircraft output (ha/day)	415.0	289.9	457.0	317.6	352.0	370.0	508.8	386.4	380.0	198.0	385.5	220.4
Aircraft idle for organizational reasons (aircraft-days)	168	323	94	301	26	60	22	52	3	241	1	274
Average daily flying (h)	4.8	4.5	5.2	4.8	3.4	4.4	4.8	4.6	5.0	4.4	5.1	4.6
Intensity of aircraft use, index	0.80	0.75	0.87	0.80	0.68	0.88	0.96	0.92	0.83	0.73	0.85	0.77

The Table shows the effectiveness of airborne crop dusting with group-based equipment in 1982. When the crops are dusted against pests and diseases, with delivery of working liquid at the rate of 50 liters/ha, the daily output of aviation equipment increased by 10.1% and time of standing idle for organizational reasons decreased to one-half of the figure for 1981 due to annual improvement of work organization. These and other indicators also improved for delivery of herbicides. As a result, all airborne work with chemicals was done for a large area at the optimum time, which assured preservation of the harvest.

The group method of basing aviation equipment provides for future introduction of intra-arm accounting, brigade organization of labor on the level of the aviation unit and, on this basis, payment of wages in accordance with the end results of performance of each production unit.

In 1982, thanks to effective organization of group basing of equipment, the entire volume of airborne delivery of chemicals in Azerbaijan was performed solely by the fleet of aircraft of the Azerbaijan Administration of Civil Aviation, without involving aircraft of other administrations. This made it possible to reduce the fleet of vehicles necessary for maneuvering, and as a result there was a significant savings of fuel and lubricants, whereas the liberated fleet of aviation equipment could be used in other parts of the country to perform work at the optimum agrotechnical time. In September 1983, the group method was used effectively for defoliation of cotton plants in Agdzhabedinskiy, Bardinskiy, Sabirabadskiy and Zhdanovskiy rayons of Azerbaijan; the work was done at the optimum time, covering 188,000 ha and maximum output, 76.3 ha/h, was achieved in Agdzhabedinskiy Rayon.

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TESTING OF PHEROMONE TRAPS

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 p 10

[Article by D. Ya. Komkov, senior scientific associate, TsINAO (Central Institute for Agrochemical Servicing of Agriculture)]

[Text] The Plant Protection Department of TsINAO tested pheromone traps in Belgorod Oblast in order to determine the dynamics of flight of male click beetles. A comparison was made of attractant properties of a synthetic sex pheromone as related to different vehicles: wax, vacuum and silicon rubber.

It was established that the males started to fly at different times (3-9 May) on different fields, with peak intensity of flight also observed at different times. This is related primarily to different soil and microclimate conditions.

Optimum attractant action of pheromone was observed when vacuum rubber was used as carrier and it was poorest with use of wax.

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10,657
CSO: 1840/1048

PROPAGANDIZATION OF BIOLOGICAL METHOD OF AGRICULTURE

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 pp 10-11

[Article by Ye. A. Frolyakina, senior methodologist, Agriculture Pavilion of USSR Exhibition of Achievments of the National Economy]

[Text] The exhibit on "Use of biological agents for protection of plants" in the Agriculture Pavilion of the Exhibition of Achievements of the National Economy of the USSR inspires much interest in visitors. It shows the scientific achievements, knowhow of progressive biological laboratories of the Russian Federation, Ukraine and Uzbekistan.

The introductory display tells about the directions of development of the biological method in the USSR: mass scale breeding and release of entomophages, production and use of biologicals, keeping records and using populations of entomophages and entomopathogenic microorganisms. With each year, the extent of biological plant protection is growing, and this is graphically demonstrated in a colorful chart. In 1970, the biological method was used on 4 million ha, it was used on 10.7 million ha in 1975 and in 1982, already on 29.6 million ha. Such a leap was made possible by establishment of new biological laboratories and entomophage breeding on an industrial basis.

In the Russian Federation, biologicals were used in 1982 on 10.6 million ha and on 67.5 million m^2 of protected soil; naturally occurring entomophages were preserved on 4.4 million ha. The Tatar laboratory is among the progressive biological laboratories represented at the exhibit; it was among the first to adopt the biological method. At the present time, it is used in this republic on over 340,000 ha and on almost 772,000 m^2 protected soil. Industrial production of Trichogramma has been set up there since 1979. It is released at 2-3 times at the rate of 20,000 to 110,000 specimens/ha; there is 66 to 76.5% infestation of eggs of pests. The breeding of green lacewing [Chrysopidae family] larvae has been organized, and their release (25 specimens/m^2) makes it possible to eradicate entirely aphids in hothouses. The laboratory also breeds Phytoseiulus, and biologicals are produced for the control of spider mites in hothouses: trichodermin, verticillin and bactorodencid. Use of bactorodencid on perennial grasses to control myomorph rodents at the "50th Anniversary of Komsomol" Kolkhoz in Baltasinskiy Rayon yielded an additional 4 q/ha hay.

The staff of the Sverdlovsk Biological Laboratory achieved much; it raises Phytoseiulus, Aphidomysa and Cycloneda; it produces trichodermin, boverin and verticillin. Phytoseiulus is used the most: on 4.5 million m^2 in 1983. Its efficacy constituted 97-98% when 120 specimens were released per m^2; harvest of cucumbers increased by 2 to 5 kg/m^2. A total of 49,000 Aphidomysa cocoons were produced, and their use at the Sverlovskiy Sovkhoz on 1500 m^2 reduced the aphid population by 84%.

The exhibit also demonstrates the technology of using trichodermin. It is applied twice: in a peat-humus mixture when making pots (20 g/m^3) and when watering rooted plants at the rate of 60 g agent/1000 m^2. Before, 30-35% of the plants in farms of Sverdlovsk Oblast were lost due to root rot, and use of trichodermin has virtually eliminated such losses. Use of this agent in 25 farms of this oblast over an area of 886,300 m^2 yielded a net profit of 1.9 million rubles. Last year, verticillin was used for the first time over an area of 120,000 m^2 to control the white fly, and its efficacy constituted 95-97%.

In the Ukraine, the biological method is used over an area of 13.7 million ha. There are 288 biological laboratories in that region. One of the best, the Kharkov Interkolkhoz Laboratory, the network of which comprises 17 rayon biolaboratories, 3 bioplants and 2 specialized shops for production of biologicals and Phytoseiulus breeding. This laboratory organizes and coordinates the work of all production departments. In 1982, Trichogramma was released on 638,000 ha, and its technical efficacy constituted 77-90%; a net income of 28-56 rubles is recovered per ruble farm expenditures. More than 40 tons of moist bactorodencid for grain crops was produced, and its use at the kolkhoz imeni Tel'man, in Kupyanskiy Rayon, on winter wheat killed 78% of the myomorphs, whereas at the kolkhoz imeni Lenin, in Balakleyskiy Rayon, it was 89% effective on perennial grasses. Release of Phytoseiulus against the spider mite in hothouses yielded an 85-90% effect. Encarsia is being raised for control of the hothouse white fly, and it is used with success on an area of 2000 m^2 of tomato fields.

The Crimea Oblast Biological Laboratory, which was founded in 1976, has a biological plant for production of Trichogramma, special shops for breeding entomophages and production of biologicals, hothouses for raising Encarsia and Phytoseiulus. In this oblast, 14 biological agents are used on 250,000 ha open ground and more than 2 million m^2 of closed ground. Of the total volume of biological protection of plants in open ground, 60% is referable to use of bactorodencid. "Aminokostnyy" [typo for amino acid-containing?] bactorodencid is obtained from the experimental production enterprise of the All-Union Scientific Research Institute of Agricultural Microbiology; it is used to treat 11,000 ha with technical efficacy of an average of 85% and economic efficiency of 5.8 rubles/ha. Moist bactorodencid for grain is also used in this oblast (72-92% technical efficacy and 6 rubles/ha economic efficiency). BIP is used against leaf-gnawing pests on cabbage, in orchards and forest strips, while bitoxybacillin and dendrobacillin are used against the fall web-worm moth.

In this oblast, production testing of a new agent was performed for the first time--lepidocid, for control of leaf-gnawing pests of fruit and vegetable

crops. When it was delivered at the rate of 0.5-3 kg/ha, beetle death constituted 87-98%. Release of Encarsia in farms of Simferopolskiy Rayon over an area of 10,000 m^2 lowered the population of hothouse white flies by 72-75%. Mass production of trichodermin has been assimilated; its efficacy constitutes about 90% and the increase in cucumber harvest was 3.4 kg/m^2.

A considerable place in the exhibit was devoted to demonstration of the advances in development of the biological method in Uzbekistan. In the last few years, use of biologicals in that republic increased by several times: in 1982 it constituted 3.2 million ha coverage. A total of 594 biological laboratories were opened, 5 of which are oblast-level facilities, 34 rayon level, 388 kolkhoz and 155 sovkhoz level; 5 laboratories are under the jurisdiction of scientific research institutions. Administration has been organized at the Uzsel'khozkhimiya [Uzbek agrochemical] Association for the biological method; the positions of chief and senior agronomists have been added to the staff to deal with the biological method at oblast and rayon departments of this association. There are 203 mechanized lines for breeding Trichogramma in this republic, and their output has been set up at the Mikond Plant. Assembly and servicing of the lines are implemented by the assembly administration under Uzsel'khozkhimiya. The biological method is the most important element of the technology for recovering large harvests of cotton and other crops.

Thanks to early determination of the size of the population of pests and their entomophages, as well as introduction of biological agents, in Namangan Oblast, there has been a significant reduction in use of pesticides; the area treated with chemicals has diminished in 7 years from 215,500 to 41,200 ha, while frequency of spraying has decreased from 2 to 0.3 times. The Namangan Experimental Biological Plant has been operating since 1980; at the present time, it has 16 technological lines for breeding Trichogramma. Their output is 7-8 kg Trichogramma and 45-50 kg Sitotroga eggs.

There is a separate display at the exhibition for the sovkhoz imeni Kirov in Fergana Oblast. This large, multicrop farm has 6500 ha of sowing fields, 4800 ha of which are occupied with cotton plants. A biological laboratory was opened in order to reduce outlay of pesticides and make effective use of entomophages; it raises Trichogramma and Habrobracon, monitors use of biologicals, observes phenology and number of pests and entomophages.

There are turnstiles near the exhibition stands, with recommendations and developments of scientific research institutes on use of the biological method of plant protection. The All-Union Scientific Research Institute of the Biological Method of Plant Protection offers practical procedures for use of biologicals. The All-Union Institute of Plant Protection developed, for the first time in worldwide practice, new technology and equipment for industrial production of Trichogramma; procedures have been recommended to increase the productivity of biological plants and improve the quality of Trichogramma. This institute is working on development of a heat-resistant form of Phytoseiulus with higher fertility and greater voracity. The Podisus, a predatory bug that is an entomophage for the Colorado beetle and Cycloneda for the control of aphids in protected ground and other entomophages are being tested for the purpose of seasonal colonization. A good effect is obtained from

using the recommendations of SANIIZR [Central Asian Scientific Research Institute of Plant Protection], the nation's leading scientific institution in the area of protecting cultivars in cotton crop rotation.

The exhibition is supplemented by samples of biologicals provided by the All-Union Scientific Research Institute of Biological Methods of Plant Protection, All-Union Scientific Research Institute of Bacterial Products and All-Union Scientific Research Institute of Agricultural Microbiology, as well as a model of a unit for spreading Trichogramma, which is undergoing a production test.

Various seminars, courses and meetings of leading workers dealing with the use of biologicals and for exchange of work knowhow are held on the exhibition premises.

Conference on Rodents

The Sixth All-Union Conference on Rodents, which was organized by the All-Union Theriological Society of the Zoological Institute, USSR Academy of Sciences, and All-Union Institute of Plant Protection, convened in Leningrad, in January 1984. It discussed matters related to theoretical and practical research on this subject.

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10,657
CSO: 1840/1048

UDC: 632.9

INTEGRATED SCIENTIFIC AND TECHNICAL PROGRAM

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 pp 12-13

[Article by S. P. Kitayev, senior expert of the Administration of the Agro-industrial Complex, USSR State Committee for Science and Technology]

[Text] Many research institutions of our country are performing work that is included in the special-purpose integrated scientific and technical program entitled "Creation, development of production and use of effective chemical and biological agents for protection of plants and animals against pests, diseases and weeds that would be safe to man and the environment." It consists of two subprograms.

The first, "Development of new effective chemicals for protection of plants (pesticides) that are safe to man and the biosphere; development and assimilation of technological processes for producing them," has the purpose of developing and introducing to industrial production pesticides that are needed by agriculture. Responsibility for its fulfillment has been placed upon the Ministry for Production of Mineral Fertilizers, and S. V. Golubkov, deputy minister of the chemical industry was approved as the administrator.

There are 70 scientific research and planning institutes and enterprises involved in solving the problems listed. The first four parts of the subprogram are concerned with development and construction of experimental, experimental production and production units for production of specific agents and the last deals with scientific research on synthesis of pesticides.

In all, the program deals with creation and development of technology for 34 products, 12 of which will be put out on an industrial scale. In the past 3 years of the 11th Five-Year Plan, enterprises have been put on line that produce 7 pesticides: herbicides--triallate, "sitrin," "acetlur," lenacil and "kotoran"; the insecticide and acaricide, acrex, and the fungicide, "polycarbacin."

Several assignments require development of general-purpose technological systems for agents and, on their basis, standardized technological processes for production of pesticides and base products for them, for example, the herbicides "semeron" and promethrin, "yalan," saturn, triallate and "ronit," the nematicide, heterophos, and insecticide, ethaphos, as well as intermediate

products for herbicides, arimesocyanates. This direction has unquestionable technical and economic advantages, since it permits use of equipment with high unit capacity and output, it is characterized by low operating expenses and energy consumption per unit end product, and it also permits rapid change from output of one product to another.

In addition, there are plans for work to develop and assimilate output of products that control processes of development and behavior of insects that are deleterious to agricultural crops.

Experimental units have already been placed on line for production of attractants for the codling moth, gipsy moth and of click-beetle pheromones.

The subprogram also provides for a search for chemical agents that are more effective and safe to the environment for protection against pests, diseases and weeds, on the basis of multifactor analysis of the link between their biological activity and intrinsic structure and physicochemical constants. Experimental batches of such agents have been produced for state field trials.

The assignments of this subprogram for 2.5 years of the current five-year plan have been entirely fulfilled.

The second subprogram, "Development of effective procedures for controlling the number of the most important deleterious species of the agrocenosis under conditions of intensive plant growing," is called upon to provide agricultural specialists with a powerful weapon for preservation of harvests. Dozens of scientific research and production organizations under different ministries and agencies are participating in fulfilling this program.

The main objective of the subprogram is to develop integrated, combined systems for protection of cultivars, which are based on the use of agrotechnology (including cultivation of resistant cultivars) combined with chemical and biological methods.

Planning and organization of protective measures within the limits of the program are based on scientifically validated forecasts of distribution and development of deleterious organisms, on the basis of strictest consideration of economic thresholds of deleteriousness, which serve as criteria of expediency of chemical treatment. There are about 1500 reporting and forecasting centers, which were organized in different regions, that observe development of pests and diseases in the nation. The data they obtain are processed by 165 laboratories and a network of zonal scientific research institutes.

About 13 million rubles is spent annually for work on forecasts and the reporting system, but this expense is warranted, since it permits a general reduction in volume of chemical treatment of vegetating plantations to one-half, with a saving of at least 1 billion rubles per year, as well as reduction of environmental pollution by chemicals.

The results of inspections made in accordance with this program make it possible to determine exactly the areas of plantations of summer and winter grain, corn for grain and silage, sugar beets, sunflowers, potatoes, tubers used for feed with average and marked weed infestation.

Economic thresholds have been elaborated of deleteriousness of dangerous phytophages of the most important crops. They were found, for example, with regard to clover, for bean and pea, clover and leaf weevils. Determination has been made of optimum time for protective measures for crops in the Noncherno-zem zone of RSFSR. We have actellic, basudin and volaton, which are delivered at the rate of 0.8-1 ℓ/ha, for control of clover pests. Instead of separate methods of using insecticides, fungicides and microfertilizers, combined treatments are proposed for use of these chemicals in mixed form at the budding phase, which reduces frequency of treating clover and expenses for insecticides. The expenses to spray crops when operations are combined are diminished by 3.9-7.3 rubles/ha, while seed yield increases by 15-24 kg/ha. As a result, the net profit with combined treatment, as compared to separate treatments, is 42 to 186 rubles/ha.

Development of resistant cultivars is an extremely important direction of work. VIZR [All-Union Institute of Plant Protection] has developed a special method for finding sources of resistance donors. Its use, for example, at the Kinel Breeding Station, made it possible to develop a large series of spring [or summer] wheat cultivars that have combined resistance to stem sawflies, fruit flies, Puccinia triticina rust, smut and are mildly vulnerable to septoria leaf spot. The Kutuluskaya cultivar is also mildly vulnerable to powdery mildew.

The need for insecticides and fungicides is drastically reduced in plantations of insusceptible and relatively resistant cultivars, and in many instances one can abandon their use entirely. As shown by preliminary estimates, use of such wheat, corn and legume cultivars makes it possible to decrease to about one-half the annual insecticide treatments, and for cotton they can be reduced by 60-70%. Introduction of such cultivars in vegetable, fruit and grape growing opens up great possibilities.

The program also provides for a considerable amount of work in the area of further development of the biological method of plant protection, including preservation of useful entomofauna. While the biological method was used on 14.6 million ha per year under the 10th Five-Year Plan, it is presently used on more than 20 million ha, and should increase to 33 million ha in 1985.

One of the main directions is development of methods of using naturally occurring entomophages. It is known that, when there is a specific number of the most important predators and parasites, the deleteriousness of phytophages is held at an economically imperceptible level, at which one can manage without chemical treatment of crops.

Trichogramma is used the most among entomophages that are raised in the laboratory: on 80% of the areas protected by the biological method. A new technology and equipment for industrial breeding of this oviparasite were developed at the VIZR, while the All-Union Agropribor Association has built and operates biological plants with a total output of 100 billion specimens per season.

In recent times, the biological method is being adopted on a particularly broad scale in the cotton-raising republics of Central Asia. In Uzbekistan, for example, mass-scale production of mechanized lines for breeding Trichogramma was organized so efficiently that it made it possible to rapidly reduce the use of toxic pesticides and environmental pollution. The economic efficiency of

using this entomophage against the bollworm and turnip moth at farms in this republic constituted an average of 40 rubles/ha on the total of 662,000 ha submitted to biological treatment.

According to the data of SANIIZR [Central Asian Scientific Research Institute of Plant Protection], as a result of increasing the use of the biological method in Uzbek SSR, there has been a 40% decrease in use of highly toxic insecticides and miticides, as compared to 1976, and 17% decrease in use of those with low toxicity; the expenses for protection of cotton fields alone dropped from 25 to 19 rubles/ha.

With respect to the tasks spelled out in the special-purpose integrated program, several scientific research institutions of our nation are developing equipment for ground-based and airborne distribution of Trichogramma. For example, special devices for airborne distribution of the oviparasite when sprinkling water on the fields have been developed and successfully tested. The technology for distributing the egg parasite by means of small aircraft is being developed at VNIIBMZR [All-Union Scientific Research Institute for the Biological Method of Plant Protection].

Use of biological agents for plant protection is quite promising in the area of vegetable growing in protected soil. Hothouse cucumbers are well-protected against spider mites by the predatory mite, Phytoseiulus, and against aphids by the green lacewing A special assignment in the program provides for development of the technological process for mass scale breeding of this predator (the larvae of which are also effective against the Colorado beetle).

In the program, much attention is devoted to development of microbiological protective agents which, as we know, have selective action and destroy only pests without harming useful insects.

About 20 different ministries and agencies are involved in fulfilling the tasks dealing with development and introduction of highly selective agents and methods of plant protection on the basis of using active substances, biophysical and genetic methods.

In particular, artificially synthesized pheromones of harmful moths are used in plant protection for the purpose of reporting and receiving information about the dynamics of population size and qualitative composition of populations. Use of at least one fewer chemical treatment on the basis of data obtained as a result of using pheromone traps would save up to 6000 tons of insecticides on a national scale.

The pheromone of a dangerous pest that makes quarantine measures necessary and is distributed in many parts of the world, the potato moth, was synthesized at VNIIBMZR. This insect is very hard to detect when its population is small. But use of pheromone traps makes it possible to detect it in good time, determine the extent of moth infestation of fields and deliver chemical control measures at the optimum time, thereby preventing appearance of the pest in other regions.

As shown by analysis of the results of fulfilling the special-purpose integrated scientific and technical program, development and broad introduction to practice of the planned steps help recover stable harvests of agricultural crops.

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10,657
CSO: 1840/1048

UDC: 632.51

WEED CONTROL SYSTEM

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 pp 14-15

[Article by Yu. A. Zlobin, doctor of biological sciences, Sumy Affiliate of the Kharkov Agricultural Institute]

[Text] The vulnerability of agroecosystems increases with increase in their biological productivity. As a result, there is increased loss of agricultural products due to weeds. For example, according to the data of Ye. Kulakov (1970) and R. I. Chancellor (1981), it constituted 9.5% of overall volume of plant-growing products in the world 10 years ago, 10% in 1975-1977 and 11.5% in 1980.

The growth of such losses is related to the increased cultivation of intensive cultivars of agricultural crops, which are notable for being less competitive with weeds, for a highly productive intensive variety is always a very sophisticated cultivar.

Agricultural science and practice are not yet prepared to adopt an integrated system for controlling weeds, which is effective only when it includes three basic elements. They are ongoing and systematic observation of the status of weed vegetation (monitoring), which is reflected in records and maps of weed infestation; forecast of level and type of weeds in the fields for the current year and future; integrated control of weeds in a differentiated manner for different fields, elements and types of crop rotation, with inclusion of agrotechnical, biological and chemical methods.

Monitoring is the technically simplest part of the combined system of controlling weeds. The methods involved have been well-refined. Visual estimates of weed infestation of crops, keeping records of sample areas with registration of planned cover, number of specimens or biomass of weeds--all this yields essentially coinciding results. Use of different variants of these methods in 1981-1982 made it possible, for example, to establish that 140-160 species of weeds are encountered in Sumy Oblast, there being 20-46 species per farm; field infestation ranges from a score of 2 to 4, with prevalence of young types of weeds.

Nevertheless, it is still a pressing task for the farms to make regular estimates of weed infestation with reflection of their results on land-use maps. This work should be done by the plant protection service of kolkhozes and

sovkhozes. Information that is not current and is not received regularly about weed infestation sometimes results in using inappropriate methods and agents for weed control, and ultimately to an increase in quantity of weeds on the fields and loss of harvest.

It is already a more complicated task to forecast the level and type of weed infestation of fields. In scientific agriculture, only the general principles have been formulated for predicting development of weeds in crops (V. S. Zuza, 1980), but there is poor development of universal formalized forecasting methods. In the most general form, forecasting is possible according to the following scheme: in the case of perennial, rhizome-type of initial infestation and perennial shoots the subsequent types of weeds will be the same, no matter what the weather is; with the young type of weeds, there will be an increase in share of hibernating weed plants following a cold winter with little snow; the share of summer weeds increases after a cool and protracted spring, whereas young weeds develop poorly after a dry spring and summer, with intensification of the role of shoot-type species.

Within the limits of one type of soil, the young type of weed depends on agrotechnical measures (soil treatment, fertilizers) and nature of crop.

It is impossible to predict the number of different species of weed plants and their proportions without consideration of an entire set of biological, ecological and agrotechnical factors. The number of plants of a specific weed species per square meter is determined by the coefficient of its reproduction (number of seeds or buds that one plant produces in a given crop), soil reserve and rate of germination of viable seeds. The nature of the crop being raised, weather conditions, methods used to cultivate soil and herbicides used influence this biological potential of a species.

One can forecast the number of weed plants with sufficient precision on the basis of matrix models. Here, the basic factors determining the number of weed plants are represented by vectors and matrices inherent in the original crop:

Vector of number of plants of given species	,	Vector of reproduction coefficients	,	Vector of seed emergence in soil	,	Vector of stock of viable seeds	,	Matrix of probability of system change to a different state
A	,	B	,	C	,	D	,	E

The total number of weed plants in the crop (T) will be: $T = (A \cdot B \cdot C + D) \cdot E$.

Example: In a field of spring wheat, used as corn precursor, the initial values of indicators in a small excerpt from a summary report are as follows (scaled to 1 m^2 crop and seed germination expressed in fractions of one):

	A	B	C	D
Wild radish [Raphanus raphanistrum L.]	62	300	0.01	42
White goosefoot [Chenopodium ambrosoides L.]	10	5000	0.01	100
Pennycress (Thlaspi]	4	900	0.005	30
Barnyard millet [Echinochloa crus-galli(L.) Beauv.]	27	800	0.01	32

Considering the fact that, in the fall, the stubble was cut down twice and the field treated with 40% 2,4-D, the matrix of change is determined as follows:

E

0.1	0	0	0
0	0.05	0	0
0	0	0.1	0
0	0	0	0.5

Simple mathematical operations by the rules of matrix algebra yield the following results:

(ABC+D)		E				T
228		0.1	0	0	0	22.8
600	×	0	0.05	0	0	= 30.0
48		0	0	0.1	0	4.8
248		0	0	0	0.5	124.0

The accuracy of predicting the number of different weed species in the above example was at the level of ±20%, which is quite adequate for practical purposes. The forecast of prevalent development of barnyard millet in the corn field was fully justified.

The overall efficacy of the proposed forecasting method depends on the professional training of the agronomist, who must know how to evaluate with sufficient accuracy the real germination of weed seeds in the ground and influence of the different purification measures and sets thereof on survival of weeds.

The data obtained by the above-described method are entered on cards [or maps] of forecasted weed infestation of crop-rotation fields. They serve as the basis for developing scheduled measures to control weeds in the next calendar year. The forecasts are defined in the spring and summer months, on the basis of current estimates of infestation.

Integrated control of weed plants can only be effective if a record is kept of the specifics of infestation of each field and element of crop rotation. Such a system should combine destruction of weed plants by agrotechnical, biological and chemical methods.

There are promising measures to stimulate weed seed germination, followed by destruction of shoots. For this purpose, the soil is rolled and special agents applied that stimulate germination (urea, gibberellin, potassium nitrate and others). Such approaches to control of weeds minimize the number of soil treatments and make it possible to lower the dosage of herbicides used.

It is expedient to temporarily alter the crop rotation on some fields that are severely stricken with weeds, as well as introduce basically new methods of treating the soil, sowing crops with high allelopathic activity for certain groups of weeds.

The assortment of agents used on a given field must be changed, alternating agents from different chemical groups and with different mechanism of action in order to prevent formation of weeds resistant to herbicides.

Control of weeds should be effected at the optimum time, with consideration of the critical periods of heightened sensitivity of cultivars to the competitive effect of weeds.

A scientifically validated system of integrated control of weeds, which takes into consideration the knowhow of progressive farms, makes it possible to minimize loss of agricultural production, reduce the amount of herbicides delivered into soil and expenses, it ameliorates the environment, etc.

Estimation of overall efficacy of the entire system of eradicating weeds is based on determination of the loss of plant-growing production that they cause. Here, there are two possible approaches: long-term estimates on the basis of data for large regions over several years and annual investigation of competitive effect of weeds on cultivated crops. The harvest loss can be calculated using the following formula:

$$L = \frac{H_c - H_w}{H_c} \times 100,$$

where L is harvest loss due to weed infestation of crops (percentage), H_c is harvest from crops that have undergone a set of weed-clearing measures and H_w is the harvest in a weed-infested field.

For example, if a harvest of sugar beets constituting 246 q/ha was obtained in one of two neighboring farms where the crop was raised using industrial technology and only 192 q/ha in the other farm, where such technology was not used, harvest loss due to weeds constituted:

$$L = \frac{246 - 192}{246} \times 100 = 21.95$$

Broad use is also made of estimates of harvest loss due to weeds, which are based on regression equations of the following appearance: $H = ax + b$, where x is the number of specimens or weed phytomass, H is harvest, a and b are coefficients characterizing the level of competing effect of weeds on the crop. Such indexes make it possible to assess the efficacy of integrated systems or individual elements of weed control.

The integral system, which includes ongoing and regular observations of the condition of weeds, forecasting, integrated weed control system and evaluation of efficacy of the measures taken against them, with determination of return on expenses, is a reliable foundation for organizing work to augment field productivity.

PHOTO CAPTION

p 15. Z. A. Ionova has been chief of the toxicology laboratory of VIZR in Michurinsk for over 20 years. In this time, about 200 chemical compounds have been tested under laboratory and field conditions; about half of them have been recommended for use in horticulture. Zoya Alekseyevna merits much credit for this work. Her profound erudition, business qualities, as well as close contact with the staff of the All-Union Scientific Research Institute of Horticulture imeni I. V. Michurin, make it possible to expedite introduction of highly effective agents to production. In addition, specialists in horticultural farms and amateur horticulturists consult Zoya Alekseyevna regularly on matters of protecting orchards against pests and diseases.

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10,657
CSO: 1840/1048

UDC: 632.954:633.18

CHEMICAL WEEDING OF RICE FIELDS

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 pp 16-17

[Article by A. G. Korovyanskiy, senior scientific associate at the VNIIPANKh GA [expansion unknown], and V. K. Sapelkin, head of laboratory at the All-Union Scientific Research Institute of Rice]

[Text] Destruction of weeds by means of herbicides is a mandatory element of the modern technology for growing rice. Much attention is devoted to choice of agents, determination of optimum dosage and time of their use, strict adherence to aviation working conditions.

Systemic and contact herbicides are used to destroy spike-bearing millet-like weeds.

The former category, "yalan," "ordram" (3.6-7.2 kg/ha*) and saturn (4-5 kg/ha) are delivered before planting the rice, before or after appearance of shoots. In order to obtain their uniform distribution on the soil surface, its top layer is loosened and leveled for presowing treatment. When herbicides are delivered before sowing, they are worked into the soil with spike-tooth or disk harrows at a depth of 5 cm. After treatment with herbicides, the fields are planted and for the next 2-3 days flooded. If herbicides are delivered after sowing, before appearance of shoots, the treated plots are immediately filled with water. Postemergence chemical weeding with systemic agents is done on moist or slightly dry soil, no later than the phase of formation of 2-3 leaves on the weeds. The schedule for rice irrigation is the same as with use of herbicides in the 2,4-D group (see below).

It is forbidden to deliver systemic herbicides by the airborne method to fields that are adjacent to bodies of water; there the ground-based method must be used.

When using contact herbicides, such as "propanid," surcopur and stam F-34, the rice shoots are obtained with use of humidifying irrigation. Water is removed from the plots 2-3 days before delivery of herbicide, and the soil is allowed to dry somewhat. Flushing irrigation is performed 2-3 times on soil with high salt content before treatment. The herbicides are delivered to moist soil when there are no more than three leaves on the weeds.

*The dosage of pesticides given in this article is for active ingredient; for determination of product outlay the appropriate calculations must be made.

The standard rate of delivery of contact herbicides depends on time of treatment, extent of infestation of check plots and weather conditions. At air temperatures of 24-26° and with appearance of 1-2 leaves on the weeds, the effective dosage is 5 kg/ha; after formation of the third leaf it is increased to 7 kg/ha. If air temperature is below 20° and the weeds have 3-5 leaves, delivery of herbicides is increased to 8-9 kg/ha. When the efficacy of an agent is low or there is appearance of many new shoots, treatment is repeated at the rate of 5-7 kg/ha.

The microspraying method is also used to destroy weeds, using a 50% oil solution of "propanid." The efficacy of such treatment is the same as with the usual spraying with aqueous emulsions. Considering the low evaporation of "propanid," microspraying is performed at air temperatures of up to 28°; wind velocity must not exceed 3 m/s. On the 3d day after treatment, the field is flooded with a layer of water up to 10 cm deep. When there are about 60 weed shoots per square meter, which have 1-2 leaves, and air temperature is above 20°, the dosage of contact herbicides is reduced to 3-3.5 kg/ha; with greater weed density and in the presence of 2-3 leaves on the weeds, as well as when air temperature is below 20°, active substance in the agents is increased to 4-5 kg/ha. Rice leaves are not burned with microspraying. Fine dark spots appear on the weeds, the plants lose their turgor and perish without visible yellowing of the leaves. Considering the fact that there are no vivid signs of weed destruction, one should not hurry to repeat field treatment.

One can enhance the efficacy of contact herbicides by adding saturn, which is a systemic herbicide, or liquid nitrogen fertilizer to the working liquid, which makes it possible to reduce to one-half the outlay of herbicide without diminishing technical and economic efficacy. A blend prepared at the plant, solution of urea or ammonium nitrate is used as liquid nitrogen fertilizer. The Table illustrates the proportion of constituents when the herbicide is delivered together with fertilizers.

Outlay of constituents per hectare

Propanid (kg active ingredient)	Urea (kg)	Ammonium nitrate (kg)	Water (liters)	Plant-produced blend (liters)
3.5-4	35	35	50	90
3	15	15	70	40
3	30	-	80	-

When weed density is low, a mixture of propanid and saturn is used in doses of 2+2 and 3+3 kg/ha; with high density (more than 100 specimens/m^2), the rate of delivery of propanid mixed with saturn constitutes 4 and 2 kg/ha active ingredient, respectively. The mixture is applied no later than the period of formation of 2-3 leaves on the millet weeds. The mixture of herbicides not only destroys the existing weeds, but prevents appearance of new ones. The treated fields are flooded with 10 cm water 2-3 days after treatment, but in the case of high ambient temperature (over 26°) 3-4 days after treatment. In the latter case, moistening irrigation is effected to eliminate toxicosis of rice plants 2-3 days before producing the permanent layer of water.

Mixtures of fertilizers and herbicides produce insignificant burns on rice leaves, which disappear 5-6 days after producing the required water layer without adverse consequences to plant development.

Scirpus, plantain, arrowhead and Monochoria are destroyed with herbicides of the 2,4-D group, 2M-4X and basagran. The best time for treatment is the period between tillering of the crop and start of tube emergence. At this time, the Scirpus has 8-10 leaves, while plantain, arrowhead and others have a leaf rosette. Crops are treated in the presence of a 10-cm layer of water, and the water level is dropped to normal (20 cm) after 1-2 days.

Delivery rate is 1.2-2 kg/ha for 2,4-D amine salt and basagran, 1-1.5 kg/ha for 2M-4X. Minimal doses are used when air temperature is 25-28° and maximal at 17-20°. When there is severe weed invasion, treatment is repeated after 1.5-2 weeks (before the rice plants emerge into a tube), with minimal delivery of the 2M-4X herbicide. On fields with a high density of Scirpus, good results were obtained in a test of propanid or surcopur mixed with 2,4-D amine salt at a delivery rate of 2.5+0.25 kg/ha when there were 3-4 leaves on the weed and 5+0.25 kg/ha when there were 5-6 leaves.

The herbicides 2,4-D, 2M-4X and basagran are sprayed at the rate of 50 ℓ/ha working liquid and 50-100 ℓ/ha mixtures.

In order to protect sensitive crops from damage by herbicides a protective zone is set up. The zone is 1500 m wide downwind and 100 m upwind for herbicides 2,4-D and 2M-4X, and for the other herbicides it is 500 and 100 m, respectively. Herbicides that are toxic for dicotyledonous plants present a particular hazard when used in calm weather or early in the morning, when the sun has not risen above the horizon, as well as in the presence of wind of variable direction. Safest conditions are present when wind velocity is 2-3 m.

Crops are sprayed from An-2 aircraft at a height of 5 m and flying speed of 150 km/h, with flaps at 5°. Downwash under the wing increases during such flight, as a result of which there is better settling of the agent, higher density of droplets on plants and increased width of coverage, to 40 m. The flying speed in a helicopter (Ka-26, Mi-2) is 40 km/h for fine and ultrafine spraying and 60 km/h for delivery of large droplets.

Up to 80 sprinklers are installed on the sprinkler rods of the An-2 aircraft. Their number and size of sprinkler holes depend on the rate of delivery of working fluid and type of spraying. There are three ways of shutting off the liquid: installation of shut-off valves in front of each sprinkler, use of a pumping unit with ejector that aspirates the remaining liquid from the rod into the tank after the sprinkler unit valve is closed, as well as use of OZh-2 device for shutting off the liquid without a valve. A pump unit with ejector is used to destroy millet-like weeds. The Ka-26 and Mi-2 helicopters are outfitted with centrifugal sprinklers.

The An-2 aircraft equipped with centrifugal or revolving sprinklers and Ka-26 helicopter with sprinklers with holes 1 mm in diameter are used for ultrafine spraying.

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10,657
CSO: 1840/1048

UDC: 632.954:633.413

USE OF HERBICIDES IN STRIPS

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 p 27

[Article by Ye. A. Kameneva and L. M. Korovina, senior scientific associates at the All-Union Scientific Research Institute of Feed]

[Text] One can increase the volume of chemical weeding, with concurrent reduction, of expenses per unit area and decreased danger of environmental pollution by delivering herbicides in strips. In order to assess the efficacy of this method, tests were conducted in 1980-1982 at the central experimental base of the All-Union Scientific Research Institute of Feed on feed beet fields. This area has soddy podzolic, clayey loam soil, and the most prevalent weeds are white goosefoot, chickweed, spreading and black bindweed, annual meadow-grass, wild radish, scentless mayweed, field pennycress and field spurrey, in quantities of 124-267 specimens/m^2.

The following herbicides were used: phenazone, 60% w.p. [wetting powder] (2.5 kg/ha on strips and 5 kg/ha with overall spreading) and lenacil, 80% w.p. (0.6 and 1.2 kg/ha) immediately after sowing, betanal 15.9 e.c. [emulsion concentrate] (3 and 6 ℓ/ha) after appearance of a pair of true leaves on beet plants. Strip width was 30 cm, 15 cm to either side of the middle of the row in the case of 60-cm row spacing. The experiment involved using the agents either individually or in combination (soil herbicides and betanal). During the vegetation period, interrows were cultivated twice in all test versions, and in the control (without herbicides) manual weeding was performed twice in addition to cultivation.

Residual herbicide levels were measured in the root crop during the period of intensive increase in its mass and during harvesting, as well as in soil, samples of which were taken at depths of 0-10, 10-20 and 20-30 cm 1, 2 and 3 months after delivery of herbicides. Gas-liquid chromatography (K. N. Novikova et al., 1981) was used to assay phenazone and thin-layer chromatography (M. A. Klisenko, 1977; V. I. Bobrova, 1977) for lenacil and betanal; sensitivity of these methods is 0.02 and 0.1-0.2 mg/kg, respectively.

It was determined that there is virtually no decrease in herbicide efficacy with use of the strip method, as compared to overall spraying, while outlay of products is reduced to one-half. In the versions with phenazone, weed

density decreased by 57-58%, with lenacil it decreased by 70-74% and with betanal by 87-88%, the latter being also quite effective without prior delivery of lenacil or phenazone. The toxicity of soil herbicides, particularly phenazone, was not adequate, and it was possible to clear the fields of weeds only by subsequent treatment of crops with betanal: with both overall and row delivery this killed 97-99% of the weeds. The use of herbicides had no adverse effect on quality of the root crop: dry matter, protein, cellulose, ash, phosphorus, potassium and calcium were on the control level.

The information listed in the literature concerning detoxification of herbicides used in sugar and food beets indicates that there are no residual amounts of phenazone, lenacil or betanal in the harvest. As yet, there are few data on this score for feed beets. Our analyses showed that there was absence of the agents in the root crop 1 month prior to harvesting after both the overall and strip use of herbicides. No soil was demonstrable in soil as early as 1 month after its application; in this period, inactivation of lenacil in a soil layer 0-10 cm thick constituted about 100% with the strip method and 88% when delivered over the entire crop (agent content was less than 0.1 mg/kg air-dried soil). Evidently, any rapid inactivation of lenacil in soddy podzolic soil is attributable to its high adsorption capacity (G. F. Lebedeva, 1981); the herbicide did not migrate in soil and was concentrated in the top layer. During the harvesting period no lenacil was demonstrable in soil either with overall delivery of the agent.

Inactivation of phenazone in soil 1 month after delivery constituted 82-91%. With the strip method of spraying the herbicide, it accumulated to a lesser extent: its levels constituted 0.12-0.21, 0.04-0.08, 0.02-0.04 mg/kg in a 0-10 cm layer after 30, 60 and 90 days, respectively with overall delivery and 0.08-0.18, 0.01-0.02 and 0.01-0.03 mg/kg with use of the strip method.

The phenazone content of soil was higher in 1982 than in 1981, apparently due to poor inactivation of the agent during the cool vegetation period. Residual amounts in the top soil layer constituted 0.08, 0.01-0.02 and 0.01-0.02 mg/kg 30, 60 and 90 days after delivery in strips in 1981 and 0.15-0.18, ... [numbers missing] -0.02 and 0.02-0.03 mg/kg in 1982.

Phenazone penetrated into soil to a depth of 30 cm; after 1 month, 2-5% and 1-2% of the delivered herbicide was found at 10-20 and 20-30 cm depths. When used by the strip method, phenazone penetrated into soil in smaller quantities, and its concentration in a 10-20 cm layer constituted 0.03-0.06, 0.01-0.02 and 0.01 mg/kg 30, 60 and 90 days, respectively, after treatment. In this experimental version, only traces of the agent were demonstrable in the 20-30 cm layer 30 days after delivery, whereas with overall delivery its concentration was 0.04 mg/kg. Subsequent treatment of feed beet crops with betanal had no effect on accumulation of phenazone and lenacil in the root crop or soil.

Thus, the strip method of using phenazone, lenacil after sowing and betanal on shoots provided for virtually complete removal of weeds, increased yield of root crop, while amount of herbicides used and their cost decreased to one-half. In addition, the lower rate of delivery of the agents provided for better clearing from plants and soil of residue of herbicides, which decomposed entirely 1 month before harvesting. Phenazone, lenacil and betanal present no hazard to subsoil water because of their poor mobility in soil.

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PROGRESS REPORTS FROM HEAD INSTITUTES

Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 84 pp 58-60

[Text] The successful performance of tasks put by the 26th Congress of the CPSU to increase the effectiveness of national production and transfer the nation's economy to the road of predominantly intensive development is closely related to acceleration of scientific and technological progress, implementation of a unified scientific and technological national policy. As we know, these tasks were defined in the decisions of the November (1982), June and December (1983) plenums of the CPSU Central Committee, the decree of the CPSU Central Committee and USSR Council of Ministers "Measures to accelerate scientific and technological progress in the national economy."

Reports on the scientific and industrial endeavors of VIZR [All-Union Institute of Plant Protection] and VNIIBMZR [All-Union Scientific Research Institute of the Biological Method of Plant Protection] in 1983, the plans for research work and introduction of scientific developments of institutes in the current year were examined and approved with consideration of these requirements at an enlarged session of the offices of the Department of Plant Protection, VASKhNIL [All-Union Academy of Agricultural Sciences imeni Lenin] in late January 1984.

The opening remarks at the meeting were delivered by N. M. Golyshin, academician-department secretary, corresponding member of VASKhNIL. Papers were delivered by K. V. Novozhilov, director of VIZR and corresponding member of VASKhNIL, and N. A. Filippov, director of VNIIBMZR. Attention was focused on the progress made in fulfilling integrated special-purpose programs, development and introduction of special measures instrumental in successful implementation of the nation's Food Program, progressive methods and means of protecting harvests, integrated protection of plants, wise and efficient use of material and technical resources.

Last year, the staff of VIZR was concerned with investigation of phytosanitary status of grain crops, summarized data on economic thresholds of deleteriousness, developed methods of forecasting a number of pests and pathogens. Active research was conducted on plant immunity and, in particular, potato resistance to the Colorado beetle. As for questions pertaining to the biological method, work in this direction was concentrated on detection of the main entomophages of grain crops, selection of viral strains of Verticillium

and Trichoderma, breeding the Cycloneda in hothouses for controlling cucumber aphids.

Comprehensive studies were pursued of optimum and effective use of chemicals for plant protection, particularly on crops raised by industrial technology. There were investigations of deleteriousness of weed vegetation in the Non-chernozem zone, aftereffects of pesticides on the aggregate of harmful and useful species, breeding promising forms.

Much attention was devoted to refinement of methods of monitoring development of harmful and useful species, airborne surveys of grain crops, forecasting development of white and gray aphids on sunflower plants.

The system of protection of grain crops developed by VIZR was introduced extensively into practice. For example, at the Giant Sovkhoz in Rostov Oblast, up to 7 q/ha grain was obtained additionally thanks to the use of this system. In 1983, according to confirmed data, the economic efficiency of introducing the recommendations of scientists at this institute exceeded 12 million rubles.

In 1984, the VIZR will continue to work on defining the economic thresholds of deleteriousness of the main pests of winter wheat in Stavropol Kray and steppe regions of Crimea. This will raise the efficacy of special measures and lower outlay of pesticides. There are plans to upgrade the method of mapping weeds on fields, develop criteria of deleteriousness of weeds in Latvian SSR. The institute's staff will prepare recommendations on the use of agrotechnical procedures to control the pest population on grain crops.

Validation of optimum level of saturation by grain crop rotation with consideration of phytosanitary condition of crops was among the main topics of research. The influence of various cultivars used in crop rotation on dynamics of number of oat nematodes in the Northwestern Zone, as well as the effect of energy-conserving technologies of soil cultivation on development of a number of barley diseases, will be defined.

The VIZR will continue to develop and introduce scientifically validated methods of long- and short-term forecasting of pest and disease development (planning preventive plant protection on the basis of long-term and many-year forecasts reduces by 30-40% the expenses for special measures).

Studies will be pursued to develop and introduce methods for accelerated development of resistant cultivars of grain, industrial, vegetable crops and potatoes. Much attention is given to use of entomophages, microorganisms and their producers in intensive plant growing, technology of mass breeding of the green lacewing, refinement of methods of producing and releasing Trichogramma, development of Cryptolaemus breeding lines, development of new biologicals and refinement of those already in use. Preparation of recommendations on wise use of biologicals and entomophages in integrated plant protection will continue.

There will also be studies of the efficacy of combined use of pesticides with biologically active agents, optimum procedures for using pesticides against a

set of pests of grain, soybean, clover, alfalfa and other crops. The plan calls for refinement of tactics in using chemicals in integrated protection of vegetable crops in protected soil, airborne control of voles, use of herbicides on grain crops; development of procedures to prevent development of herbicide resistance in pests; investigation of aftereffects of chemicals; wise use of fungicides, etc.

In 1983, the VNIIBMZR concentrated mainly on development and introduction of methods of using entomophages, microorganisms and their producers in intensive plant growing. Studies were made of species composition and biological distinctions of the natural enemies of the main pests and diseases of agricultural crops; technologies were developed for mass production of biological agents for plant protection and evaluation of their quality, as well as procedures for practical use of biologicals.

About 400 cultures of microorganisms were isolated, including entomopathogenic viruses, bacteria with antagonistic activity against sunflower white rot, entomopathogenic and nematophagous fungi, fungi that are hyperparasites of pathogens of sclerotiniosis, root rot, powdery mildew and other diseases, entomopathogenic protozoans and nematodes. Studies were made of biocenotic links of the set of parasites of leafrollers; determination was made of factors affecting the quantitative characteristics of host-parasite systems of miner moths; determination was made of species composition, distribution and structure of tiger and ground beetle, as well as spider, fauna. This work was done in apple orchards of the intensive type.

Substantial changes were made in the technology of breeding Trichogramma on the basis of investigations of the distinctions of the Angoumois grain moth, which made it possible to increase by 1.5-2 times the output of biological plants.

Methodological instructions on production of Trichogramma at biological plants were prepared and published (jointly with VIZR, the Ukrainian Scientific Research Institute of Plant Protection and Agropribor [agroinstrument] NPO [scientific production association]). Work was continued on mass breeding of the green lacewing. Results were obtained that are of basic importance to production of capsulated synthetic nutrient media for predatory arthropods. Prototypes of equipment for reproduction of imagoes and recovery of eggs of the green lacewing were developed and built, together with the Agropribor NPO. With regard to microbiological agents, technological procedures were refined for cultivating pathogens and antagonists; studies were pursued of interaction of different groups of infectious agents in order to develop combined biological preparations.

Considerable attention was devoted to methods of evaluating the quality of biological agents for plant protection. For example, a high-speed method of identifying the species of six Trichogramma species was developed and tested, which makes it possible to effect continuous taxonomic monitoring when it is bred on a mass scale. Together with the Agropribor NPO, laboratory and field tests were made of equipment for release of Trichogramma from the ground. The efficacy of Trichogramma in the control of the cabbage moth constituted 76.3%, versus 50.8% with manual distribution. Production tests of an experimental prototype of apparatus for airborne distribution of Trichogramma were made on 4500 ha corn with the participation of the VNIIPANKh GA [expansion unknown].

The efficacy of the oviparasite in control of the cornborer constituted 62.9%. Production testing of a set of useful arthropods--Encarsia, Phytoseiulus and green lacewing [Chrysopidae]--was performed on 2000 m^2 of hothouse area with success for protection of cucumbers against melon and cotton aphids, spider mites and white flies. Use of entomophages and acariphages made it possible to eliminate use of pesticides, whereas 11 treatments with chemicals had been delivered at a standard hothouse.

Last year, the staff of VNIIBMZR synthesized several sex pheromones, including that of the grape mealybug, American fall web-worm moth, potato moth and several other pests. Active constituents of sex attractants of the Circumflexa moth, pine and Siberian moths, scarce vaporer moth and other insects have been found and, in a number of cases, identified. An active search was made for materials to synthesize preparative forms of sex pheromones.

The plan for introduction and experimental production testing of the developments of VNIIBMZR was fulfilled in its entirety. The most significant work was: integrated protection of intensive orchards (20,000 ha), vineyards (150,000 ha), use of pheromone traps to determine time for control and detection of sites of the codling moth, European grape moth, bollworm, potato moth and other pests (1 million ha in different parts of the USSR), use of the entomopathogenic fungus, Verticillium lecani for control of white flies in hothouses (145 ha). Recommendations were prepared on mass breeding, storage and use of Trichogramma.

In 1984, the VNIIBMZR will continue research on the main problems of development of the biological method. Work is expanding on methods of keeping records of entomophages, breeding and protecting useful insects, synthesizing sex pheromones, organizing special measures and practical use of biological agents at farms, as well as other problems.

Academician P. I. Susidko, of the VASKhNIL and V. Ye. Kuz'minov (Soyuzsel'khozkhimiya [All-Union Scientific Production Association for Agrochemical Services to Agriculture]), who reviewed the work of VIZR, praised the basic directions of scientific work, the large scale of the problems studied and highly applied orientation of investigations. It was suggested that theoretical research be expanded, more attention be given to preparation of methodological recommendations, reliability of forecasts be improved on the level of republics, krays and oblasts.

The reviewers for VNIIBMZR, S. S. Izhevskiy (VNITIKiZR [All-Union Scientific Research Institute for Technology of Feed Production and Plant Protection?]) and V. N. Titayev (Soyuzsel'khozkhimiya) also rated highly the performance of this institute, which is conducting a broad set of studies on the basic problems of development of the biological method, actively introducing the results of developments to production. It was suggested that the plan include problems of biological control of weeds, that preparation of a list of promising microorganisms be expedited for introduction, that the project dealing with demonstration of pyrethroids in plant residue and soil, which is not germane to this institute's interests, be transmitted to another organization.

The following participated in the discussions: N. N. Mel'nikov, corresponding member of the USSR Academy of Sciences; V. F. Peresypkin and N. V. Bondarenko, corresponding members of VASKhNIL, S. P. Kitayev (State Committee for Science and Technology), L. M. Izvekova (Soyuzsel'khozkhimiya) and V. E. Savzdarg (ZASHCHITA RASTENIY [Plant Protection] journal). In general, the speakers approved the plans for scientific research of the leading institutes. There were also some critical comments. In particular, it was indicated that there is still duplication of topics, and that the results of the studies of republic institutes are not always included in integrated systems. There are also plans and projects that could be implemented well by sectorial and republic-level institutes. It was suggested that the results of research dealing with the most dangerous elements--root rot, smut, chinch bug, beet webworm, Colorado beetle, rodents, locusts, etc.--be reported in greater detail. It was recommended that work be expanded in the area of organizing plant protection and, in determining the economic thresholds of deleteriousness, to mandatorily also take into consideration such important factors as presence of entomophages, distinctions of cultivars and agrotechnology, condition of plants, expected harvest and climate conditions in the course of the year.

The administrators of the leading institutes called attention to the need to receive validated plan-assignments.

The following issues were also discussed at a meeting of the department office: "Forecasting development and distribution of the most important agricultural pests and diseases in 1984, suggestions on organization of optimum measures to control them" (report delivered by A. F. Chenkin, Central Institute for Agrochemical Servicing of Agriculture); "Improving efficiency of scientific collaboration with foreign countries on plant protection" (report by N. N. Mel'nikov, corresponding member of the USSR Academy of Sciences, and K. V. Novozhilov, corresponding member of the VASKhNIL).

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CSO: 1840/1048

UDC 612.822.1+612.815.1

MOLECULAR ORGANIZATION OF GLUTAMATE-SENSITIVE NEURONAL MEMBRANES: BINDING OF L-[^{3}H] GLUTAMATE TO RAT CEREBROCORTICAL SYNAPTIC MEMBRANES

Moscow BIOKHIMIYA in Russian Vol 49, No 1, Jan 84 (manuscript received 25 Mar 83) pp 67-74

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[Abstract] Binding studies were conducted with cerebrocortical synaptic membranes derived from outbred rats to further define the nature of glutamate interaction with neurotransmitter-sensitive membranes. Utilizing L-[^{3}H] glutamate ligand revealed two basically different binding sites, one sodium-dependent and one sodium-indifferent (SD and SI, respectively). The binding data obtained for the SI sites yielded values of 140-160 nM for K_d and 3.8-4.5 pmoles/mg protein for the V_{max}, with corresponding values of 1.8-2.0 nM and 45-50 pmoles/mg protein for the SD sites. Binding of the ligand was enhanced 2.1-3.3-fold by 100-150 mM Na^+ and by 5-10 mM Ca^{++}. The high binding constants and the subcellular localization of the SI sites indicate that they represent a true receptor system for glutamate, while SD binding may represent active transport mechanisms in the brain. Figures 6; references 31: 5 Russian, 26 Russian.
[1501-12172]

UDC 581.198

BIOSYNTHESIS OF DELTOFOLIN FROM [2-^{14}C]ACETATE AND [2-^{14}C]MEVA-LONATE IN DIOSCOREA DELTOIDEA LEAVES

Moscow BIOKHIMIYA in Russian Vol 49, No 1, Jan 84 (manuscript received 1 Apr 83) pp 75-80

PASESHNICHENKO, V.A., GURIYELIDZE, K.G., VASIL'YEVA, I.S. and GUSEVA, A.R., Institute of Biochemistry imeni A.N. Bakh, USSR Academy of Sciences, Moscow

[Abstract] Young and mature leaves of Dioscorea deltoidea were employed in studies on the incorporation of [2-^{14}C]acetate and [2-^{14}C]mevalonate into

the different moieties of the deltofolin molecule. Mevalonic acid was seen to be incorporated only into the steroid moiety of deltofolin, and exceeded the incorporation of the radiolabeled acetate. The acetate label was incorporated into 3-hydroxy-3-methylglutaryl-, the sugar, and the aglycone moieties of deltofolin, with most of the label (78.5%) in the 3-hydroxy-3-methylglutaric acid component. These observations indicate that dioscine and 3-hydroxy-3-methylglutarate are synthesized independently, and suggest that deltofolin is produced by the esterification of dioscine by 3-hydroxy-3-methylglutarate Mevalonic acid serves only as a precursor for the diosgenin moiety of the deltofolin molecule. References 12: 3 Russian, 9 Western.
[1501-12172]

UDC 633.1:[575.113+577.21]

PLANT GENOME AND PROBLEMS IN GENE ENGINEERING

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 5, May 84 (manuscript received 31 Oct 83) pp 99-107

[Article by Yu. M. Sivolap, All-Union Breeding and Genetics Institute, Odessa]

[Text] On the basis of our own research and data found in the literature, we present a discussion of parameters of specific and intraspecific variability in genome size, the number of ribosomal genes, divergence of the genome fragment, including genes, coding proteins, all studied using physico-chemical methods, in light of prospects for developments in gene and genetic engineering.

The majority of agricultural crops being cultivated are in need of substantial improvement in terms of their resistance to extreme environmental conditions and disease, and in terms of the quality of the product being synthesized. It is well known that proteins synthesized in the kernels of cultivated cereals are generally low in lysine, tryptophan, and threonine; and beans have a relatively low content of methionine. The harvest of winter barley is often reduced significantly as a result of plants dying during harsh winter weather, and the productivity of corn is limited by its inadequate resistance to drought.

The development of new forms and improvement of forms of plants already being cultivated is being carried out primarily by recombination of different genes using the sexual hybridization method. Traditional selection methods are relatively simple and accessible, and they are the basic instrument used to grow new plant varieties and hybrids; their possibilities are far from being exhausted. It should also be pointed out that these methods are subject to the limits of crossability. Intraspecific diversity cannot always provide donors that have the same features and properties as other species. It would be desirable to enrich barley with the genes that provide resistance to low negative temperatures and are found in rye; corn would be improved by the genes for resistance to drought that are found in sorghum, and so on.

Reports on the synthesis of soy proteins in grains of rice, caused by an injection of soy mRNA into the generative organs of rice, and on the development of sun beans--sunflower cells containing French bean genes--are still primarily publicity, rather than strictly scientific reports.

Species with closely related genomes, such as wheat and rye, can include separate fragments of chromosomes from the similar species in the composition of the genome. Fragments of rye chromosomes have been found in the Avrora and Kavkaz varieties of wheat, and in the Mironovskaya variety 10 whole chromosomes of rye have been found. These species are capable of uniting their sets of chromosomes and starting a new species--triticale. According to data presented by Mitra and Bhatia[1], the DNA in wheat and rye is very similar, and almost 100 percent hybridization is possible. Although work on remote hybridization has been carried out for a long time, only the rye-wheat hybrid, triticale, is being produced on a large industrial scale.

A need has arisen to seek out methods and approaches that would make it possible to isolate and unite separate genes or polygene systems that determine economically valuable and biologically beneficial characteristics from various species. The gene engineering that is being developed successfully in microorganisms has opened up tantalizing prospects. The discovery of genetic transformation in procaryotes stimulated the development of a technique for isolating separate genes, introducing them into the composition of vectors, and transferring them into cell systems. Genes from higher organisms have been introduced successfully into bacteria and the genes have been expressed. It is well known, for example, that a section of eucaryote DNA, which codes a certain protein, is introduced into a bacterial plasmid; it is then synthesized in the procaryotic system and is produced in experimental quantitites.

A change in the sequence of DNA nucleotides in microorganisms when introducing genes isolated from higher organisms does not lead to substantial disruptions of transcription and translation. The structure of the genome in procaryotes is considerably simpler than in eucaryotes, and the nucleotide composition of DNA in different types of microorganisms varies widely; therefore the system of regulating transcription and translation in procaryotes is not sensitive to this type of variability.

The variation in the nucleotide composition of DNA in cultivated plants is not as great as in procaryotes. There is practically no difference in the content of G + C in members of the cereal family, such as wheat, barley, and corn. The specificity of plant genomes depends to a significant extent on the particular distribution of groups of sequences of nucleotides with different numbers of copies. Flavell[2] believes that this is one of the mechanisms hindering recombination between homologous chromosomes in interspecific crosses. Furthermore, the nature of the distribution of sequences of DNA nucleotides can affect the expression of genetic information.

Up until now the introduction of exogenous DNA into intact plants and its expression have been a problem and are the object of discusssion. In cells of higher animals, with the help of metaphase chromosomes and DNA, the transfer of genes for hypoxanthine-phosphoribosyl-transferase[3], thymidine kinase[4], and adenine-phosphoribosyl transferase[5] has been demonstrated, which in principle indicates the possibility of genetic transformation of higher organisms.

One needs to know the characteristics of the organization of the genome and the parameters of variability in genome structures in order to develop programs for utilization of gene engineering techniques for improving plants.

Characteristics of the molecular organization of the genome in higher plants. Since the possibilities for using the sequential organization method to analyze the molecular structure of genomes in higher organisms are limited, the method for determining the kinetics of reassociation of DNA, RNA(DNA)-DNA hybridization, and other techniques that make it possible to determine the degree of similarity among genomes, thier fragments, or separate families of genes, are being used extensively in the analysis of the molecular structure of the genomes of higher plants. An analysis of the kinetics of DNA renaturation revealed fundamental differences between the genomes of procaryotes and eucaryotes. In microorganisms there are practically no fragments with repeating sequences, while it is characteristic for the genomes of the majority of higher plants with more than two picokg of DNA in the nucleus, to have a significant proportion of DNA with repeating sequences (>65 percent). Genes from which ribosomal, transfer, and histone RNA is transcribed, account for no more than 1 percent of the genome, and inversion and multi-copy (10^{6}-10^{4}) seqences with clearly defined functions account for 10-15 percent. The area of middle repetitions in plants is the broadest. About 40-50 percent of middle repetitions are probably not structural genes.[6] According to the hypotheses stated by Britten and Davidson[6] and Georgiyev[7], part of the middle repetitions may perform regulatory functions, that is, they may participate in the expression of genes at the transcription level. This implies a high degree of specificity and strict control over the expression of genetic information.

On the whole, animal genomes consist of single-copy ("unique") sequences. Unlike animals, plants do not have systems for active response to changing environmental conditions, such as poikilothermism and the ability to move, so under various temperature and light conditions they have different metabolic pathways that are activated. For example, winter wheat can be induced[8] to grow into a tube when the day is prolonged at a lower temperature, or with a shorter period of light and a relatively high temperature. It is clear that here different regulation systems should be functioning depending on the conditions, which also causes an increase in the fraction of regulatory genes.

In plants and animals iRNA is transcribed from 5-10 percent of the sequences of the slowly reassociating fraction of DNA. Probably, as a result of the different size of the fraction, the relative quantity of structural genes in plants is much smaller than in animals. Plants with a large genome (essentially all cultivated types of plants) contain an avgrage of 1-10 copies of nucleotide sequences in the slow-reassociation fragment[9]. For this group of sequences in higher plants, the term "low-copy" DNA is more appropriate, as opposed to the terms used for animals, where the analysis of the kinetics of reassociation makes it possible to isolate single-copy "unique" DNA.

All higher plants have inherent alternation of sequences of DNA nucleotides, with varying repetition frequency. The low-copy coding segment alternates to varying degrees with repeating untranslated sequences. This fact can be confirmed relatively easily by isolating three kinetic fragments of DNA and analyzing the kinetics of reassociation of each of them individually. The numerical differentiation of the kinetic curves makes it possible to examine the families of sequences within the limits of genome (kinetic) fragments. For example, the characteristics of the distribution of DNA nucleotides, varying in

terms of size and number of copies, in the barley genome were established by the reassociation of marked fragments of DNA of varying lengths (the tracer) and unmarked DNA of a constant size (the driver)[10,11].

Thus, an analysis of the molecular organization of a genome in higher plants using physico-chemical methods, showed that in this group of organisms the DNA has a heterogeneous linear structure with varying types of organization of the nucleotide sequences within the limits of one genome. In barley a minimum of nine types of organization of the nucleotide sequences in DNA were found[11].

The determination of the characteristics of the molecular organization of the genome in higher plants made it possible to use molecular biology methods to study specific and intraspecific variability, which was once considered an object of genetic research exclusively. Attention is now being given to indicators such as the content of DNA in nuclei, comparison of genetic fragments of DNA, and the structure of individual cistrons.

Genome size. The content of DNA in a haploid set of chromosomes--the "genome size"[12]--first attracted the attention of investigators as early as the 1950s, almost simultaneously with the discovery of the genetic role of DNA. A general trend was revealed for the quantity of DNA to increase in the species that are more developed in evolutionary terms. The existence of deviations from this general rule led Britten[13] to propose that "genome size" should mean its most conservative fragment. Later on this characteristic was named the "kinetic size of the genome," since it took into account the unique fraction of DNA. A change in the DNA content of a nucleus may be tied to different processes, such as polyploidization, polynemia, and amplification of individual segments of the DNA; therefore, a kinetic approach makes it possible to evaluate only one of the many different evolutionary changes in the genome.

The genome of a number of agricultural plants of polyploidal origin does not have a unique fraction; therefore, for an analysis of the size of the genome and the nature of its variability it is necessary to study both the total content and the volume of the slow-reassociation kinetic fragment of DNA taken separately. Table 1 contains data on the quantity of DNA in the nucleus based on the haploid chromosomal set in a number of cereal species and varieties.

There is a strong correlation between the size of the genome in cereals and the quantitative and qualitative composition of the specific set of chromosomes. The experiment's high degree of accuracy makes it possible to determine the corresponding interspecific and intraspecific differences. Genomes of the Odesskaya 16 and the Bezostaya 1 varieties differ by 5.7 percent, while the genomes of the Novomichurinka and Druzhba varieties differ by 11.8 percent. The differences are significant with a maximum probability >0.999. In the majority of cases the intraspecific differences in Triticum aestivum are not as great as that between the Bezostaya 1 and Odesskaya 16 varieties. According to data from the analysis of 6 contemporary varieties of an intensive form of this species, the content of DNA in the nucleus differs by no less than 1 percent.

Table 1. Genome size and parameters of the low-copy DNA fraction in cereals

(1) Вид, сорт	(2) Размер генома, $\times 10^9$ п. н.*	(3) Доля малокопийной фракции ДНК в геноме, %**	(4) Размер малокопийной фракции ДНК, $\times 10^9$ п. н.	(5) Число копий во фракции	Размер однокопийного участка ДНК медленно-реассоциирующей фракции (моногеном), $\times 10^9$ п. н. (6)
(7) *Triticale* АД-825	24,87	21,74	5,41	4	1,35
Triticum aestivum Одесская 16 (8)	15,37	29,29	4,50	3	1,50
(9) Безостая 1	16,25	29,18	4,74	3	1,58
T. durum Дружба (10)	12,42	25,14	3,12	2	1,56
(11) Новомичуринка	11,11	23,60	2,62	2	1,31
Hordeum vulgare Одесский 31 (12)	5,45	29,95	1,41	1	1,41

*The optical density of cell nuclei stained using Felgen's technique was measured by means of a Vickers densiometer (made in Great Britain). The preparations were made from synchronized tissues of roots, fixed, hydrolyzed, and scanned at 590 nm. The experiment was conducted within the framework of a joint program between the Functional Morphology of Chromosomes Laboratory at the Molecular Biology Institute of the USSR Academy of Sciences and the Molecular Biology Institute of the All-Union Plant Breeding and Genetics Institute of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin.

**The kinetics of DNA reassociation were evaluated by the optical method using an Acta M-4 spectrophotometer (Beckman, USA). The size and number of copies for the slow-reassociation fragment were calculated by means of special programs on a Triumf Adler DC 2000 computer (FRG).

Key:

1. Species, variety
2. Genome size, x 10^6 p.n. [expansion unknown]
3. Proportion of the low-copy DNA fragment in the genome, percent
4. Size of the low-copy DNA fragment, x 10^6 p. n.
5. Number of copies in the fragment
6. Size of single-copy segment of DNA of the slow-reassociation fragment (monogenome), x 10^6 p. n.
7. AD 825
8. Odesskaya 16
9. Bezostaya 1
10. Druzhba
11. Novomichurinka
12. Odesskiy 31

The size of the fragment of low-copy DNA, on the basis of which the kinetic size of the genome is calculated, is also characterized by specificity. The kinetic size of the genome is the largest in the 56-chromosome triticale AD-825, and smallest in barley, that is, it corresponds to the size of the genome that is determined cytophotometrically (table 1).

The majority of the cereals studied are polyploids, in which the genome is made up of a set of different genomes; evidence of this can also be seen in the number of copies in the slow-reassociation fragment. The size of the single-copy segment, or what Kir'yanov et al. call the monogenome[14], in polyploids is 1.3×10^6-1.5×10^6 p. n. This confirms the evolutionary conservatism of the slow-reassociation fragment of the DNA and indicates the common origin and common principles of organization of these genomes.

Intra- and interspecific variability in the number of copies of genes of ribosomal RNA in a genome. Genes that code 18S and 25S rRNA are included in the composition of middle-repeating DNA in higher organisms. They account for a relatively small share of chromosomal DNA. Because of their exceptionally important function in protein synthesis and the relatively uncomplicated methods for isolating rRNA, ribosomal genes in higher organisms were studied earlier than others. Genes from which rRNA is transcribed are arranged in tandem in the area of the nucleolus organizers[15], and with genotypical stability their number can vary within a single species or between species[16,17].

Since many gene engineering projects are tied in one way or another to the protein synthesis system, which includes ribosomes, it is of interest to determine the parameters of variability for the genes' rRNA. First and foremost, we should point out that plants have a much higher number of these genes than one finds in the genomes of animals. For example, shoots of the Odesskaya 16 hexaploidal wheat were found to contain 11,762 copies of the rRNA genes, the Odesskaya 10 corn was found to contain 10,306; and the Odesskiy 31 barley as found to contain 6213; while higher animals have between 100 and 600.

Intraspecific rDNA variability can be traced easily in agricultural cereals. For example, in the Priboy variety of wheat, rDNA accounts for 0.278 percent of the nuclear DNA, and in the Bezostaya 1 variety it accounts for 0.153 percent; in quantitative terms this represents 14,292 and 7851 genes, respectively. The quantity of ribosomal genes can change in the process of ontogenesis. For instance, in metabolically inactive dry germs and actively developing shoots of hexaploid wheat the rDNA content is 0.086-0.140 percent and 0.153-0.278 percent, respectively. The number of rRNA genes in the shoots exceeds the number in the germs on the average by a factor of 1.5, and in individual cases, by a factor of 2.5.

The changes in the copying of rRNA genes in ontogenesis does not confirm the hypothesis of Phillips et al.[19] and Siegel[20], which states that the abundant quantity of rDNA in higher plants provides a high level of rRNA synthesis without amplification of the corresponding genes. Apparently, the entire area containing rDNA is subject to amplification and reduction. We should assume that not all rDNA genes are transcribed simultaneously. The large quantity of

these genes and the genotype variability opens up broad possibilities for breeding plants with greater protein synthesis.

The majority of investigators have not found a correlation between the quantity of ribosomal genes and indicators of protein accumulation in the seeds of agricultural plants. We studied the quantity of ribosomal genes in high-protein varieties of wheat (Atlas 66 and Pardue 4930 with 14-15 percent protein in the grain) and relatively low-protein varieties (Gaines and Priboy, with 10-11 percent protein). We did not find a connection between the quantity of the ribosomal genes and grain protein indicators. At the same time, in closely related genotypes--the Odesskaya 10 and the high protein forms 10-38 and 10-44, obtained from this variety by Sysoyev[21] --there was a correlation between an increase in the number of rRNA genes and the ability to synthesize a higher quantity of protein.

In the formation of a characteristic, such as the grain protein content, the primary factor is not the abundant quantity of rRNA genes, but rather their effective functioning. Table 2 indicates the correlation between the quantity of rRNA genes and the content (in percent) of protein in wheat grains during the milk-wax ripening phase.

Table 2. The quantity of ribosomal cistrons in the genome of wheat varieties, per 1 percent of protein in the grain

(1) Вид, сорт	Содержание белка в зерне, % (2)	Число рРНК генов в пересчете на 1% белка (3)
Triticum aestivum		
Atlas 66	15.46	365.7±13.6
Pardue 4930	14.64	268.1±15.7
Gaines	10.74	577.5±21.3
Прибой (4)	11.94	431.7±24.6

Key:

1. Species, variety
2. Kernel protein content, percent
3. Number of rRNA genes per 1 percent of protein
4. Priboy

According to our data, in high-protein varieties of wheat there is a significantly lower quantity of rRNA genes per unit of protein synthesized in the grain; the genes are probably transcribed more intensively. An analysis of the quantity of ribosomal genes in soy varieties with varying protein content in the kernel, conducted by Doerchung et al.[22], confirms the principle that we revealed. For example, in the Ranovo variety (52.6 percent protein) there are 19.3-24.7 copies of rRNA genes per 1 percent of protein; and in the R1-88298 variety (34.7 percent protein) there are 45.5-47.2 copies of rRNA genes for every percent of protein. We should mention that the synthesis of protein in the soy seeds is highly effective, where the quantity of ribosomal genes per unit of protein (1 g/100 g dry weight) is on the average one-tenth the quantity found in the agricultural cereals studied.

Divergence of the low-copy fragment of the genome. The overwhelming majority of nucleotide sequences that serve as a matrix for rRNA are located in the

fragment of slow-reassociation low-copy DNA. Therefore, to evaluate the degree of divergence of genomes, especially in the area of structural genes, these fragments are compared by means of hybridization and an analysis of the hybrid molecules that are obtained. Britten et al.[23] found intraspecific divergence of "unique" DNA up to 4 percent in individual samples of Strongylocentrotus purpuratus.

Since genes that code proteins determine to a great extent the qualitative basis of a genotype, we studied DNA-DNA hybrids of low-copy DNA of different varieties of soft wheat and barley. We analyzed the Atlas 66, Pardue 4930, Gaines, and Priboy varieties of wheat, and 2 biotypes of the Odesskaya 16 variety. The choice of varieties was determined by the availability of information on the most important phenotypical characteristics, including the set of components in the spectrum of alcohol-soluble proteins in the endosperm, which is characterized by inter-variety polymorphism. The spectrums of alcohol-soluble proteins in the varieties studied were specific to a significant extent (about 50 percent of the components were the same). The phenotypical characteristics that differed among the varieties are described in table 3.

Table 3. Primary phenotypical differences among wheat varieties used in experiments on DNA-DNA hybridization of low-copy fragments of genomes

(1) Признак	Atlas 66	Pardue 4930	Gaines	Приboй (2)	Одесская 16 (3)
(4) Цвет колоса	Белый (15)	Красный (17)	Белый (15)	Белый (15)	Белый (15)
(5) Остистость	Безостая (16)	Безостая (16)	Остистая (24)	Безостая (16)	Остистая (24)
(6) Цвет зерна	Красный (17)	Красный (17)	Белый (15)	Красный (17)	Красный (17)
(7) Высота растения, см	100	100	75	100 (25)	100
(8) Зимостойкость	Слабая (18)	Слабая (18)	Слабая (18)	Выше средней	Высокая (22)
(9) Содержание белка в зерне, %	15,46	14,64	10,74	11,94	13,08
(10) Качество муки	Низкое (19)	Высокое (22)	Низкое (19)	Хорошее (26)	Высокое (22)
(11) Устойчивость к бурой ржавчине	Умеренная (20)	Устойчив (23)	Восприимчив (21)	Умеренная (20)	Восприимчив (21)
(12) к стеблевой ржавчине	Умеренная (20)	Устойчив (23)	Восприимчив (21)	Восприимчив (21)	Восприимчив (21)
(13)					
(14) к желтой ржавчине	Восприимчив	Восприимчив	Устойчив (23)	Умеренная (20)	Восприимчив (21)

Key:

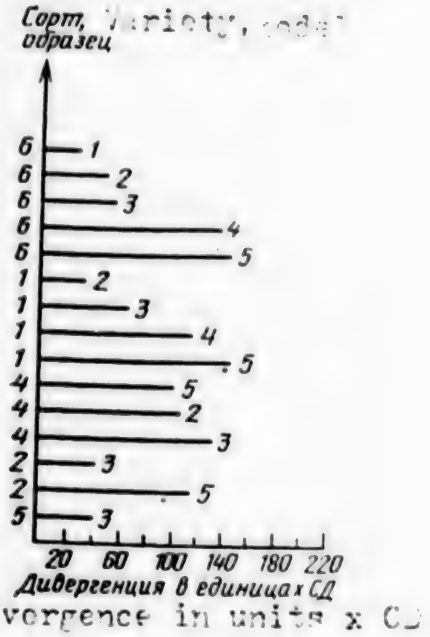
1. Characteristic
2. Priboy
3. Odesskaya 16
4. Color of ear
5. Growth of awns
6. Color of grain
7. Plant height, cm
8. Winter resistance
9. Protein content in kernel, percent
10. Quality of flour
11. Resistance
12. To brown rust
13. To stem rust
14. To yellow rust
15. White
16. No awns
17. Red
18. Weak
19. Low
20. Moderate
21. Susceptible
22. High
23. Resistant
24. Awns present
25. Above average
26. Good

At present it is not possible to identify precisely the number of genes that determine the characteristics in which varieties of wheat differ phenotypically. The genetics of the majority of economically valuable polygenic characteristics, such as productivity, frost-resistance, resistance to disease and pests, have not been studied sufficiently. No more than 300 genes have been included in a preliminary evaluation of the differences among genotypes of the varieties studied in terms of their phenotypical expression.

The relative value of the DNA-DNA hybridization in the varieties studied is close to 100 percent, which is the result of significant similarities in the low-copy sequences within the limits of the type. The level of divergence of genomes is determined on the basis of an analysis of temperature stability of hybrid complexes T_{pl} and its changes ΔT_{pl} according to the corresponding method (the change in T_{pl} per 1° C corresponds to 1 percent of nucleotide substitutions)[24]. The values for ΔT_{pl} that were obtained experimentally for homoduplexes and heteroduplexes are somewhat low due to the polymorphism of the DNA, caused by the heterogeneity of the experimental material. The varieties of wheat from domestic breeding, which are sown over great areas and consist of a set of biotypes and varieties bred abroad, are reproduced under conditions that differ from the original conditions and also exhibit polymorphism. The level of heterozygosity can be evaluated by Britten's formula[23]. In this case the differences in low-copy DNA reach 3.2 percent (^{3}N-DNA Atlas 66 x DNA Odesskaya 16).

We can obtain a quantitative description of the divergence by studying the thermal stability of homoduplexes and heteroduplexes at several points, that is, by analyzing the profiles of thermoelution. The coefficients of divergence are calculated by means of the formula presented in Shubina's work[25]. The figure presented here depicts the values of the coefficients of divergence (CD) among the T. aestivum varieties. The varieties studied can be divided into 3 groups on the basis of the CD values: CD < 50, CD < 110, CD > 110. An insignificant divergence is observed in closely related forms: biotypes of the Odesskaya 16 varieties, the Priboy variety and the Odesskaya 16, Atlas 66, and Pardue 4930, which have a common ancestor (the Brazilian Frondozo variety), exhibit the same small divergence with respect to the Priboy variety. This variety differs from the Atlas 66 and Pardue 4930 varieties in terms of resistance to negative temperatures and disease, and in terms of protein content. Considering the insignificant divergence in the fragment of low-copy DNA, we should assume that the characteristics in which the varieties differ depend to a great extent on the functions of the regulatory genes, represented by the middle repetitions.

The Gaines variety is distinquished by a high coefficient of divergence with respect to the varieties analyzed. In geographically remote varieties (Atlas 66 and Odesskaya 16, Pardue 4930 and Odesskaya 16) there was also a significant divergence in the low-copy genome fragment.



Divergence of the fragment of low-copy DNA in different wheat varieties and biotypes: the fragment of low-copy DNA was isolated by means of column chromotography on hydroxyapatite according to parameters after mathematical analysis of the curves of kinetic reassociation, molecular hybridization was carried out in direct and inverse reactions; the tracer was marked with ^{3}N using the nick-translation method; the coefficient of divergence was calculated on the basis of thermal elution curves[25]; 1--Pardue 4930; 2--Priboy; 3--Odesskaya 16 1153; 4--Gaines 5--Odesskaya 16 2153; 6--Atlas 66.

Divergence in units x CD

An analysis of the transcription activity of DNA in various types of eucaryotes showed that structural genes account for only 4-11 percent of the low-copy DNA fragment[26,27]. Nucleotide substitutions in sequences that code proteins directly, because of the degeneration of the genetic process, do not always lead to changes in the primary structure of the proteins. The majority of structural genes are ancient in evolutionary terms and genes for new proteins probably arise by means of combining different segments of coding sequences or as a result of duplication, which changes the sequence of nucleotides in a DNA chain. These modifications appear during thermal denaturation as a change in the stability of heteroduplexes. It is possible that in the area of low-copy DNA, which does not contain coding sequences, there is more rapid accumulation of nucleotide substitutions.

On the whole, it shcuid be pointed out tnat molecular hybridization determines polymorphism of fragments of low-copy DNA. If we suppose that 3.2 percent of this DNA in wheat is subject to variability, which corresponds to approximately 1.5×10^{8} nucleotide pairs or 100,000 structural genes 1.5×10^{3} p. n., it is obvious that there is a wider range of genotypical variability than phenotypical variability. A preliminary genetic analysis shows a difference of no more than 300 genes between varieties within T. aestivum.

The correlation between phenotypical and genotypical variability (m) can be described by the following formula: $m = N \times B/G \times \alpha \times K$, where N is the maximum number of genes by which the varieties differ (the fixed genotypical variability); B is the size of the structural genome of eucaryotes (in drosophila this is 1.5×10^{3} p. n.); G is the size of the genome (the number of pairs of foundations); α is the proportion of the low-copy fragment in the genome; K is the divergence of sequences of nucleotides determined by molecular hybridization (percent). Thus, for the Odesskaya 16 variety, $m = (300 \times 1500)/(15.37 \times 10^{9} \times 0.2929 \times 0.032) = 3 \times 10^{-3}$.

Consequently, the correlation between phenotypical and genotypical variability, determined by the molecular hybridization method, indicates that only about 0.3 percent of the genome changes are expressed genotypically. This causes certain

difficulties for gene engineers, since it substantially reduces the probability of the expression of exogenous DNA introduced into a genome.

Thus, physico-chemical research methods make it possible to identify certain characteristics of the molecular organization of the genome in higher plants (the size of the genome, the existence and size of fragments of slow, medium, and rapid repetitions, and similarity among genomes) and variability parameters. The plant genome is a dynamic system in which several types of changes in the nucleotide sequences have been discovered. Characteristic of multi-copy genes, such as ribosomal genes, are quantitative genotypical specificity and variability in the number of copies, depending on the activity of the organism. The effectiveness of the transcription of rRNA genes depends on the characteristics of the type, the variety, and specialization of the tissue. The fragment of low-copy DNA, which includes structural genes, is subject to divergence of up to 3.2 percent. A change in the nucleotide sequences is not always expressed phenotypically and the probability of expression does not exceed 3×10^{-3}. When making controlled changes in the genomes of agricultural plants, it is necessary to consider these characteristics in the organization of their genetic apparatus and the parameters of variability. Most agronomical characteristics have not been studied much in genetic terms and still cannot serve as objects of applied gene engineering. It should be pointed out that definite prospects in this direction were opened up in research on genes that code reserve proteins in plants. Basic elements of gene engineering techniques are being used along with procaryotic systems for cloning cDNA genes that code proteins. A major obstacle in putting existing gene engineering developments into practice is the absence of stable regeneration of plants from individual cells of the most important cereals. Resolution of this problem will make it possible to introduce altered sequences that code proteins into individual cells and to cultivate plants with improved protein content. A number of laboratories here in our country and abroad have started work to resolve these problems. The existence of so many problems in this field demands joint applied and fundamental research as a whole, and unification of efforts of geneticists, physiologists, biochemists, and molecular biologists within the framework of a unified program. The expected effect from application of gene engineering to improve agricultural plants is so great, that we can already talk about a second "green revolution."

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ENVIRONMENT

CLEAN AIR

Minsk SOVETSKAYA BELORUSSIYA in Russian 11 May 84 p 3

BEREZKIN, D., chief state inspector for protection of atmospheric air in Belorussian SSR, and YEFIMOVICH, V., senior state inspector

[Abstract] Air quality is of current concern as one of the most valuable of the natural resources, and details are presented on the measures undertaken at a number of the industrial plants in Minsk in preventing air pollution. Unfortunately, certain establishments seem to take their responsibilities to the citizens and the State lightly and have not implemented concrete steps to be in compliance with laws and directives regarding air quality. This problem is not unique to Minsk, and similar foot-dragging can be seen at plants in Vitebsk, Mogilev and other Belorussian cities. Consequently, it is appropriate at this point in time to remind the directors of plants, that are not in compliance with clean air standards, about article 21 of the Belorussian SSR Statutes, concerning the responsibilities of industrial complexes in preventing air pollution, and article 24, which deals with the responsibilities of the various ministries, state committees, and departments in enforcing such laws.
[630-12172]

BRIEFS

PROTEIN-A SYNTHESIZED FOR DIAGNOSTICS--In a total of several minutes a new diagnostic preparation produced at the Leningrad Scientific-Research Institute of Epidemiology and Microbiology imeni Pasteur will help determine the presence of a menacing infectious disease such as tick encephalitis. We asked the Institute's deputy director, Professor F. S. Noskov, to comment on this development: "The new preparations is synthesized by microbes. And so it is called--staphylococcal protein-A. It turns out that this protein possesses a property that is very necessary for diagnostics. It attracts and concentrates antibodies, i.e., the body's protective proteins. These antibodies in turn combine with antigens, the microbial etiological agents of diseases.... By using this feature, protein A is "loaded" with specific antibodies. With the aid of such a "magnet" the etiological agents of a corresponding disease "are trapped" even at a very low concentration. And if, let us say, such a protein is tagged by fluorochrome and added to a preparation in which the etiological agent is to be found, this entire process doesn't take more than three minutes. The remarkable property of A-protein to attract antibodies can also be used for another important purpose. It can be used to help separate sequentially the protective proteins of variable "direction" from donor blood which, alas, is far from being fully utilized. The preparations produced in this way are exceptionally pure and active, and the donor blood can be utilized with practically no losses. Protein-A is very expensive abroad--20 thousand dollars for one gram. The preparation manufactured in Leningrad is significantly less and is of a quality that is not inferior to that the foreign-produced variety. In essence, this new-generation preparation is relatively inexpensive, standardized, and highly sensitive and can be produced by a fully automated process. The technology of its production has been jointly worked out by scientists and production line specialists at the Institute imeni Pasteur. Requests for the new effective preparation, whose production in our country was first developed in Leningrad, are being received not only from dozens of institutes in our own country, but from many foreign firms. [By T. Chesanova] [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 7 Jun 84 p 4] 6289

UDC: 63:576.8

MICROBIOLOGICAL INDUSTRY IN AGROINDUSTRIAL COMPLEX SYSTEM

Moscow EKONOMIKA SEL'SKOGO KHOZYAYSTVA in Russian No 4, Apr 84 pp 55-61

[Article by R. Rychkov, chief of Main Administration of Microbiological Industry under USSR Council of Ministers]

[Text] The workers in the microbiological industry, which is a young and rapidly developing sector of the national economy and part of the nation's agroindustrial complex, are making a sizable contribution to implementation of our country's Food Program. Questions related to development of this industry and its future are always at the center of attention of the CPSU Central Committee and Soviet government.

The "Basic Directions of Economic and Social Development of the USSR in 1981-1985 and up to 1990" outline measures to accelerate development of production on the basis of microbiological synthesis. It is the goal of the 11th Five-Year Plan to provide for 1.8-1.9-fold increase in output. In the nation's Food Program, specific tasks have been put to this industry pertaining to increased output of feed yeast and lysine, and other types of products for agriculture.

Thus, Soviet microbiological science and industry have been given a task of major national importance: to direct the powerful capacities of biotechnology, bioorganic chemistry, gene engineering, industrial microbiology toward output of economically valuable products, primarily for sectors of the agroindustrial complex, out of cheap, nonagricultural, naturally occurring and chemical sources of raw materials: feed protein and lysine, antibiotics for feed and veterinary purposes, feed vitamins, agents for plant protection, enzymes, premixes, bacterial fertilizers and other products of microbiological synthesis.

The inception and development of this sector can be viewed as the logical result of purposeful development of one of the most important directions of scientific and technological progress, reflecting not only the increasing objective needs of the economy, but feasibility of developing a basically new type of highly economical technology of industrial production based on utilization of the biological potential of living organisms, which is unique in its effectiveness.

In fulfilling the decisions of the historical 26th Party Congress and subsequent plenums of the CPSU Central Committee, the workers in this sector made

some strides in the 3 years of the current Five-Year Plan. The volume of industrial output was increased by 39.6%, that of feed protein production increased by 1.6 times, including 2.1-fold increase in output of protein-vitamin concentrates, lysine production increased by 47.3% and premix feed by 13.7%.

The year 1983 marked a breakthrough in development of the microbiological industry. The CPSU Central Committee and USSR Council of Ministers adopted a special decree that defined the future development of microbiological synthesis output. A broad program of steps has been outlined for the period up to 1990 with regard to development of microbiological and other products required to obtain high-quality feed. When all the problems outlined in the decree are solved, it will be possible to improve significantly the supply of good-quality feed, balanced in protein and other constituents, for the livestock industry and to fulfill the tasks spelled out in the USSR Food Program of augmenting the output of the livestock industry.

In 1983, the microbiological industry succeeded in fulfilling the State Plan. Tasks were performed dealing with net (standard), marketable and sold products, output of the main products of microbiological synthesis. A total of 10,700 tons of feed protein, 194 tons of lysine and 4000 tons premixed feed were produced, in excess of the planned amounts, and delivered to consumers. The plan was overfulfilled for production of antibiotics for feed and veterinary purposes, enzymes, microbiological agents for protection of plants, furyl alcohol and consumer goods. At most enterprises of the sector, ancillary farms have been established and are developing rapidly for production of meat, milk, vegetables and fruit. As compared to 1982, the volume of industrial output of the sector as a whole increased by 14.4%, feed protein output increased by 17.4%, lysine by 36.7 and premixes by 4.8%. There has also been significant increase in output of a number of other products.

Growth of output of products of microbiological synthesis was attributable to improved use of the already existing industrial potential, as well as faster introduction of planned capacities at enterprises started up in 1981-1982. The level of utilization of capacities for production of feed protein increased by 11%, as compared to 1982 and for lysine by almost 1.5 times. In 1983, the leading enterprise of the sector in production of protein-vitamin concentrates, the Svetloyarskiy Plant in Volgograd Oblast, started up ahead of schedule. Production of enzymes at the Ladyzhin Plant was started up ahead of the scheduled time. The largest plant of the sector for lysine production, in Shebekino, is operating at the planned capacity. The targets of the Five-Year Plan for production of feed antibiotics, enzymes, lysine, vitamins and other types of products have been met or considerably overfulfilled.

Labor productivity in the industry has increased by 11.1%, as compared to 1982. As a result of this, there was a 79% increase in industrial output. About three-quarters of the increase in labor productivity was achieved as a result of introducing to industry the advances of science and technology, starting up new types of industrial production, technological processes and equipment. The plan for profit from industrial activities has been fulfilled. The increased profits were due, to a significant extent, to reduction of production costs. The expenses per ruble marketable product have been reduced by 4.21%, as compared to the 1982 level. However, there are still some enterprises operating at a loss in the sector, particularly in the hydrolysis industry,

although their number was dropped. As a result of improved management, lysine production has become profitable. Growth in profits and profitability, reduction of cost of basic types of products were the result of purposeful work by enterprises and organizations to make economical use of rawstuff, materiel, fuel and energy resources.

In the area of feed protein production, technological progress in the last 10 years developed in the direction of augmenting unit capacity of fermentation equipment contained in technological lines of large-scale production from 4-6 tons to 30-35 tons/day with utilization of hydrocarbon raw material and from 4 tons to 12 tons/day with use of hydrolysates of raw material of plant origin. There has been significant improvement of technical and economic indicators in production of feed yeast as a result of introduction of highly productive cultures of microorganisms. For example, outlay of paraffin per ton protein-vitamin concentrates has dropped from 1.28 to 1.13 tons. The yield of feed yeast per ton absolutely dry plant raw materials increased from 155 to 192 kg. Protein content of protein-vitamin concentrates increased from 55% in 1970 to 62% in 1983, which made it possible to recover an additional 87,500 tons protein per year.

At the Shebekino and Charentsavan plants of lysine production, an integrated sterile system was developed and introduced, which increased the output of lysine by these enterprises by 1.8 and 2.4 times, respectively, in 1983 as compared to 1982. A new technology has been assimilated in the sector for recovery of lysine on the basis of acetic acid, which provided for increase in production capacity without additional capital investments. The increase in lysine output was also aided by introduction of highly productive strains, biological stimulators of microorganism growth and new nutrient media.

Some achievements have been made in production of enzyme preparations, which have been finding increasing application in agriculture in recent times. Rules are being developed for production and use of immobilized enzymes, in particular, glucose isomerase experimental batches of which have been delivered for recovery of glucose and fructose syrup from starch. Production of a number of enzymes of nucleic metabolism, oligonucleotides and polynucleotides needed for research in the field of molecular biology and gene engineering has been started up.

In 1981-1983, considerable capital investments have been made for development of this sector. Operational capacities have been started up for production of protein-vitamin concentrates at the Angarsk, Kremenchug, Novopolotsk and Mozyr plants, for production of premixed feed at the Saratov, Talitsa and several other enterprises.

In 1983, there was some improvement in the area of capital construction. The volume of capital investments and construction-installation work increased by 33.7 and 34.9%, respectively. Production capacities have been started up for output of about 90,000 tons protein-vitamin concentrates, 128,000 tons premixed feed and 120 conventional tons of enzymes. In December, the world's first experimental production installation was started up for production of feed protein derived from natural gas. Use of this method for protein production will broaden significantly the raw materials base of this sector.

Much work was done at sector enterprises dealing with wise and economical use of fuel and energy resources, as a result of which 102,500 tons conventional fuel, 3.8 million Gcal thermal energy and 750 million kW·h electricity were saved in 1983. The tasks in the State Plan referable to conserving fuel and energy resources were overfulfilled as a result of better utilization of energy capacities, improvement of production technology, increased output, updating steam power plants, replacement of obsolete steam boilers with new ones, improving energy systems at enterprises, increasing demands made of all services and departments for wise use of fuel and energy, intensifying educational and explanatory work among workers.

The positive changes achieved in performance of the sector in 1983 are largely due to broad deployment of socialist competition and increase in its effectiveness. The system of organizing and managing socialist competitions is being refined. Its most mass scale form is competitions among workers in the leading occupations for the title of "Best worker in his profession," among foremen, Komsomol youth groups and brigades in the basic industry. Starting in 1982, competitions have been organized for fulfillment and overfulfillment of production and delivery plan for protein and other feed supplements during the cattle wintering period. By competing for increased output and delivery of feed supplements, output of feed protein increased by 11.3% and lysine by 39.7% in the fourth winter quarter of 1983, as compared to the same period in 1982.

The highest achievements in the socialist competition were made by the workers of the Novopolotsk Plant of Protein-Vitamin Concentrates imeni 60th Anniversary of the USSR, Berd "Order of Red Banner of Labor" Chemical Plant, Svetloyarsk Plant of Protein-Vitamin Concentrate Production, Livany Experimental Biochemical Plant, Lesozavodsk Biochemical Plant and many others.

One of the principal tasks put to the sector is to build up in every way the output of protein and other feed supplements in order to improve the supply of balanced and high-quality feed to the livestock industry.

According to the data of the USSR Ministry of Agriculture, inadequate supply to the livestock industry of protein, amino acids, vitamins, antibiotics and other biologically active substances leads to a greater overexpenditure of feed, extension of fattening period, incomplete utilization of capacities of livestock complexes and farms.

The search for alternative potential and real sources of high-protein feed supplements has long since led specialists to the conclusion that broader use must be made of industrial methods of biological conversion of nonprotein types of raw materials. Their advantages are that microbiological synthesis provides for an unprecedented speed of protein recovery, for the production of which large space or special weather and climate conditions are not required, as compared to plant growing and livestock farming. It can be organized in any part of the country that is rich in sources of nonfood, carbohydrate or chemical, hydrocarbon raw materials. The process is continuous, around-the-clock and intensive.

The research pursued for 20 years revealed that microbiological feed protein is analogous to fish and bone meal, soybean oil cakes and other high-protein

supplements with respect to amino acid composition and, consequently, biological and zootechnical efficacy. It contains over 50% digestible protein, with a large share of lysine and other biologically active substances. Yeast is superior to all known feed proteins of plant and animal origin in group B vitamins. It contains minerals in a biologically active form, lipids with a good ratio of saturated to unsaturated fatty acids. Yeast enzymes enhance significantly the digestibility and assimilation of feed. Protease activity of yeast is twice as high for pepsin as for bone meal, 2.8 times higher than fish meal and 5-10 times higher than for barley and peas.

At the same time, we believe that the method of determining the economic efficiency of using this sector's products in agriculture, considering only the cost of additional livestock products, is not an adequate criterion for assessing the efficacy of a given product, since this does not take into consideration the effect of lowering the cost of livestock products, turnover of circulating capital, increased return on investment and other economic factors. Apparently, after appropriate additional work, this question must be settled through the joint efforts of specialists in agriculture, economics and industry.

The worker groups of the sector, in accordance with the guidelines of the Party and government, are directing their efforts primarily toward fuller use of the existing production and scientific-technological potential, available capacities for production of protein, lysine and other feed supplements. A wide program has been deployed for the planning and construction of several new industrial enterprises with a high protein output.

The role of science is growing in matters of expanding the raw materials base and developing progressive technological processes. It has been proposed that work be accelerated on investigation of potential types of raw materials, development of highly productive equipment for large-scale production, running processes under sterile conditions that withstand repeated sterilization, as well as to provide the sector with modern automation equipment in order to fulfill the tasks set forth by the CPSU Central Committee and USSR Council of Ministers to the USSR Academy of Sciences, ministries and agencies that furnish the microbiological industry with raw materials, equipment, instruments for checking and controlling technological processes. There are plans to remodel 8 plants, build 25 new ones and to expand production at 22 operating enterprises. Much attention is being given to refurbishment, updating equipment, intensification of processes by increasing productivity of strains of microorganisms.

One of the most important scientific and engineering problems being solved by this sector's specialists is production of amino acids in crystalline and highly concentrated forms. In 1990, output of crystalline lysine will reach 30% of its total production. The rest will be put out in dry, concentrated form containing up to 70-80% of the basic active ingredient.

Antibiotics that are produced by our sector are important to the composition of food allowances. Their output will increase in the years of the 12th Five-Year Plan. There are plans to produce new, more effective antibiotics.

Evidently, there will be broader use of enzymes to feed animals and for ensilage of fodder that is difficult to ensilage (clover, vetch, alfalfa and straw). The nutritional value per kg dry silage produced with addition of enzymes increases by about 10%. Use of fermentation based on lactobacilli and propionibacteria is also an effective means of improving the nutritional value of silage. When young cattle are fed such silage, the daily live weight gain increases by 10-12%.

In many countries of the world, a search is in progress for means of using the enormous resources of the annually replenished plant materials for feed, such as wood pulp, straw and agricultural waste. The presence of cellulose and hemicellulose makes these natural types of biomass promising substitutes for crude plant and carbohydrate fodder. However, when given in their natural form, the animals assimilate poorly the beneficial ingredients due to the stable lignon-carbohydrate bonds in the plant complex. In our country, about 150-170 million tons of straw and a considerable amount of agricultural plant waste are not yet being utilized efficiently enough. Some farms submit straw to barothermal treatment. This increases somewhat its nutritional value, but the feed resources are not fully utilized with such treatment and, moreover, this process involves considerable expenditure of energy.

Chemical, acid or fermentation hydrolysis of straw followed by yeast enrichment is the most promising. It makes it possible to increase protein content of feed mass from 3 to 10-12%. Introduction of this method on a large scale could seriously facilitate solving the problem of protein-balanced feed. The same method could be used to process other agricultural waste. It is possible to break down the complicated polysaccharide plant complex by means of soft hydrolysis and to recover feed that is readily assimilated by animals, which contains sugar (15%) and cellulose (40%).

Production of so-called plant-carbohydrate feed, as well as hydrolysis syrup--feed sugar recovered as a result of hydrolysis of wood pulp or peat, is also being set up in the sector. Estimates show that 1 ton of hydrolysis sugar replaces 5 tons of sugar beets or 20 tons of feed beets, thus liberating up to 5 ha plowed fields. But there are some economic problems. It is imperative to work more actively on lowering the cost of production of such a carbohydrate concentrate.

Increase in volume of production and expansion of assortment of microbiological agents for plant protection is an important reserve for increasing agricultural productivity. Wide use of chemical agents for plant protection yields rather good results. But it must be borne in mind that, from the standpoint of environmental protection, it is also necessary to search for biological agents, which do not disrupt the balance of nature as they fulfill their main function of protecting plants and do not cause death of useful insects, birds, animals and are safe to workers.

At the present time, the technology has been developed and production is being set up for a number of effective microbiological agents for treatment of seeds to control different diseases, as well as stimulation of root formation and increase in number of tubercles on leguminous plant roots. For example, presowing treatment of seeds with trichodermin (4 kg/ton) lowers the incidence of root rot by 54-71% and increases the harvest by about 2 q/ha.

Other promising directions are also being developed to augment productivity of plant growing. Bacterial fertilizers containing nitrogen-fixing microorganisms have been developed and are already in use. Presowing treatment of legume seeds with nitragin or rhizotorfin increases pea and soybean yield to 7 q/ha and green mass of leguminous grasses to 90-120 q/ha. The positive properties of these fertilizers are their complete safety to man and animals, neutrality for the ecological balance of nature.

Biotechnological production is inherently dependent on the quality of microbiological cultures, strains producing biologically active substances, their capacity for a large output with optimum technical and economic indicators, as well as optimum levels of the basic active ingredient. New information in the area of breeding and genetics of industrial microorganisms, gene engineering and molecular biology makes it possible to design and obtain producers capable of increasing by several times the product yield, with increase in productivity of processes and output of agents within the same industrial space and with the same equipment, but with insignificant capital investments. In the next few years, there are plans to considerably increase the output of feed yeast, antibiotics and vitamins as a result of only augmenting strain productivity. Analogous steps are being taken for technical refinement of other production processes in the sector.

There are plans for increase in unit capacity, development of new, highly productive machines and units, change from development and introduction of different types of equipment to development and introduction of systems of machines, complex lines covering the entire technological process, further expansion and intensification of mechanization and automation of labor-consuming types of production, producing stock using basically new equipment, technology and control systems.

In accordance with a program that has been outlined, automated technological lines that are 1.5 times more productive than existing ones and equipped with more powerful fermenters are being developed for production of feed yeast from p-paraffins, and they will be introduced under the 12th Five-Year Plan. One such fermenter yields 50 tons of digestible protein (or up to 100 tons marketable product) per day, whereas the best equipment at existing plants yields up to 30 tons/day. For recovery of amino acids, there are plans to start up technological lines that are twice as productive as existing ones.

Use of ultrafiltration equipment, spray dryers with granulators and other types of latest equipment is expanding in the production of enzymes, and they increase significantly the efficiency of production and product quality. This will permit faster change to output of products in progressive marketable forms. In particular, 60% of the feed yeast will be put out in granulated form by 1990. This is not only convenient for use in agriculture, but for container-free transportation of the ever increasing amounts of protein.

There will be a wider assortment of amino acids that are produced. There are plans for output of tryptophan, threonine and glutamic acid for use not only as feed supplements, but directly in the production of foodstuffs and medical products.

In the enzyme industry, there are plans for output of immobilized enzymes and multiple enzyme combinations for intensification of processes in the food industry sectors. There are plans for recovery of highly purified crystalline enzymes for use in medicine, veterinary practice and research.

The latest directions of modern biology are being developed with increasing intensity; their achievements have an accelerating effect on development of industrial microbiological synthesis. Effective means are emerging for development of new feed products, biologically active preparations, immunostimulating and growth-enhancing agents. Products are being developed to improve resistance of agricultural plants to pests, pathogenic microorganisms, salinated soil and accelerate recultivation of soil microflora. It is estimated that, already in a few years, production of many products of microorganism synthesis will take place primarily on the basis of producers developed by gene engineering methods.

The elapsed 3 years of the 11th Five-Year Plan were a period of active introduction to the sector of brigade organization of labor, which was one of the important factors in increasing its productivity. At the present time, about 60% of the workers are working in specialized and combined brigades that have been organized in enterprises of the sector. As a result of improved organization of labor and interchangeability, a considerable number of workers have been released and assigned to new production sections. Normal course of production is no longer conceivable at many enterprises without brigade organization of labor. It is instrumental in strengthening socialist labor discipline, advancing production qualifications and responsibility of brigade members for the end results of labor, and it is the deciding factor in the struggle for improving efficiency of production and quality of work.

This year, the brigade form of organization and stimulation of labor will be further developed in this sector. There are plans to augment by at least 10% the share of workers organized into brigades and to introduce brigade cost-accounting.

The sector's associations and enterprises are proceeding toward predominant formation of start-to-finish combined brigades, which best meet the distinctions of continuous production.

The physical expenses, as cost of production in the microbiological industry, constitute about 60%, including 25-27% for fuel and energy, which is indicative of its high materials consumption. The workers are taking steps to save on raw materials, chemicals, fuel, energy and other physical expenditures as they fulfill the tasks spelled out for additional 0.5% reduction of production cost by the December (1983) Plenum of the CPSU Central Committee.

The achievements in 1983, the outstanding performance of many worker groups at enterprises and production associations of the sector have provided beneficial conditions for successful performance of the tasks put to the industry for 1984. As stressed in the decree adopted by the December (1983) Plenum of the CPSU Central Committee, "... absolute fulfillment of planned assignments, conscientious and highly skilled labor constitute not only the obligation, but patriotic duty of each worker group, each Soviet citizen."

In 1984, the plan provides for 6.8% increase in labor productivity, as compared to 1983, and 70% of the increase in industrial production must be provided based on growth in labor productivity.

Questions of acceleration of scientific and technological progress are of special relevance to development of our sector. In 1984, the efforts of teams are directed toward speedy introduction of continuous technologies for hydrolysis of wood pulp raw materials, assimilation of experimental production of feed protein from natural gas, intensification of existing production, increased output of ready products per unit raw materials and other measures. This will make it possible, in particular, to reduce the outlay of paraffins per ton of protein-vitamin concentrates, increase recovery of lysine per cubic meter of fermenter capacity per day, save a considerable amount of fuel and electricity.

To assure the fulfillment of established objectives of saving fuel and energy resources, additional steps are being taken at the sector's enterprises to augment product yield per unit processed raw materials and equipment, increased use is being made of waste from hydrolysis, lignin, as a secondary fuel, and the boiler rooms of a number of enterprises are switching from fuel oil to gas.

Serious tasks have been put to the microbiological industry in 1984 with regard to capital construction. Capital investments for development of the sector should increase by almost 1.5 times, as compared to 1983, and by 30% for housing construction. It is planned to increase by 2.4 times the start-ups of capacities to produce feed protein and to increase the lysine-producing capacities by a volume that equals almost 70% of those available at the start of this year.

Implementation of the tasks put to the sector will require assistance on the part of the USSR Gosplan, USSR Gossnab, contracting ministries of construction and our other partners. Enterprises of the hydrolysis industry, some of whose production capacities have been operating for 30-45 years already, are in particular need of such help. At such plants, the equipment, building and installations are obsolete, and fixed asset wear constitutes over 50%.

More refined equipment, progressive technological processes, starting up new types of production, advancing the technical level of production, introduction of modern means of optimizing and controlling production are required for highly productive labor.

The scale and rate of development of the sector make it necessary to pay close attention to questions of environmental protection and wise use of natural resources. As was indicated at the December (1983) Plenum of the CPSU Central Committee, this is not only an economic, but social task. Organizational and technical measures have been developed and are being implemented at enterprises of our industry to improve the technical efficiency of existing systems for dust and gas removal and reducing discharge of waste into the atmosphere. Gas and dust-trapping installations with an overall capacity of 1,150,000 m^3/h will be put in operation. There are plans to implement more than 65 measures for remodeling some suction and ventilation systems, updating gas- and dust-trapping installations, installing additional purification and other systems using the capital overhaul fund and the fund for development of production.

Adherence to the necessary proportions between growth of production potential and development of raw materials base in allied sectors is one of the most important factors in providing for and maintaining a high pace of production in our sector. Unfortunately, in the first years of the 11th Five-Year Plan, particularly 1981 and 1982, there was some lag in development of capacities for production of liquid paraffins, which are the raw material for production of protein-vitamin concentrates (Parex installations). The question of timely start-up and assimilation of capacities at enterprises of the sector involved in output of protein, premixed feed, lysine and other types of products is equally important.

Further strengthening of collaboration with sectors that furnish raw materials and materiel to enterprises of the microbiological industry is still one of the most important economic objectives. There are still quite a few problems that must be solved together with chemical machine-building, instrument-building, chemical industry, timber and wood working industry workers, with sectors that use our products.

Last year, there were radical changes in attitude toward the needs of the microbiological industry on the part of our partners--ministries and agencies that supply raw materials, chemicals, fuel, equipment and build our facilities. More attention is now given to the performance of enterprises and construction sites of our sector by local Party and soviet bodies. We interpret this assistance as recognition of the growing role of our sector in developing the nation's economy, and we must respond to such increased attention with doubled, tripled energy in our work.

The counterplans and socialist obligations taken on by worker groups for 1984 give us grounds to expect that the objective set forth by the Party, of increasing labor productivity by 1% over and above the plan and lower production costs by an additional 0.5% will be fulfilled and overfulfilled.

The workers in the microbiological industry have interpreted the statement of comrade K. U. Chernenko, general secretary of the CPSU Central Committee, which he made at the February (1984) Plenum of the CPSU Central Committee, "... we should advance without stopping. We should advance on the basis of all that was achieved before, by creatively enriching past achievements, concentrating collective thought, energy of communists, the working class, the entire nation on unsolved problems, on key problems of the present and future. All this obligates us in many respects," as a guide for action. Shock work, and successful fulfillment of the assumed socialist obligations will be the worthy contribution of sector workers to the cause of economic and social progress of our country, and fulfillment of the Food Program.

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10,657
CSO: 1840/610

UDC 636.5.081

CREATION OF HIGH-PRODUCTIVITY POULTRY CROSSES ADAPTED TO CONDITIONS OF INDUSTRIAL TECHNOLOGY

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 5, May 84 (manuscript received 11 Jan 84) pp 3-13

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[Text] The present paper describes results of poultry selection and scientific research studies conducted during the current five-year plan to create ne crosses and improve existing crosses adapted to conditions of industrial technology. Methodological techniques to improve product quality and reduce production costs are presented.

The poultry breeding sector has been assigned an important role in the fulfillment of the USSR Food Program up to the year 1990, as a supplier of dietary food products--eggs and poultry meat. These products have a high biological value, and they contain essential amino acids, vitamins, and macro- and microelements.

In order to increase the production of poultry meat and eggs and to improve their quality, it is necessary to make continuous improvements in existing breeds and crosses, and to create new, more productive crosses that are adapted to industrial technology.

Contemporary industrial poultry breeding is based on the utilization of high-productivity hybrid poultry, obtained as a result of crossing lines specially developed for their productivity. The effectiveness of utilizing hybrid poultry is determined by the phenomenon of heterosis, which can be obtained only when crossing matching lines. In connection with this, in selection work with poultry a great deal of attention is given not only to increasing the productivity of a poultry line, but also to matching these lines to obtain parent forms and the final hybrid. The hybrid offspring obtained from matching lines of egg-laying chickens have good egg-laying qualities and they are healthy. The yield of eggs from one hen increases by 5-15 percent. As a result of crossing lines of meat-bearing poultry, the yield of meat from each hen of the parent form increases by 7-10 percent by combining high-intensity growth in body weight of the offspring that is inherent in the

paternal parent form, and the high reproductive properties of the maternal parent form.

A well-defined system of interconnected breeding farms has been developed and introduced to produce hybrid poultry in this country. The first link in this system consists of scientific research institutions that are conducting in-depth selection work to create new poultry lines and crosses and to improve existing ones. The Selection Center at the All-Union Poultry Breeding Scientific Research and Technology Institute has methodological control over this work. The second link consists of poultry breeding enterprises that perform family selection for the maintenance, further improvement, and expanded reproduction of lines of poultry of industrial crosses. Scientific research institutions are responsible for methodological control at the breeding enterprises. The third link consists of first-order reproducer breeding farms, which work with original parent flocks of crosses, obtaining poultry from breeding enterprises and supplying second-order reproducer breeding farms with incubation eggs or chicks for forming parent flocks. The role of second-order reproducers is most often performed by parent flocks from industrial poultry farms.

Thus, this system of breeding farms makes it possible to have in the country a relatively small population of poultry of original lines and crosses, and to utilize only hybrid poultry at industrial poultry farms.

Hybrids of 2, 3, and 4-line crosses are used in egg production both here in our country and abroad and the majority of these hybrids are created using the white leghorn breed as a base. Hybrid hens of these crosses are characterized by high egg-laying qualities (270-280 eggs per 12 months of productivity) and a high production return on feed (2.4-2.5 kg of feed per 1 kg of egg weight).

Over the past 10-15 years a number of European countries have been making extensive use of crosses created on the basis of colored breeds of chickens, such as the Rhode Island Red, the striped Plymouth Rock, etc. The egg-laying capacities found in hens of these crosses are somewhat lower than the indicators for hens of the white leghorn breed, but the egg weight is higher by 2-3 g (ranging between 62 and 64 g) and the eggshell is brown. As a rule, these crosses are autosexing, that is, the males and females differ when they are just one day old in terms of the color of their down.

Hybrid chickens, turkeys, and ducks of specialized crosses are used in meat production. In our country the production of chicken meat primarily involves raising young birds to 7-8 weeks old that are crosses of meat-bearing breeds. In these crosses the cornish breed is usually used as the paternal parent form and the white Plymouth Rock is usually used as the maternal parent form. Young turkeys raised for meat reach the age of 12 or 17 weeks, and ducks reach the age of 7 weeks. In 2 or 4-line crosses of turkeys, the white broad-breasted breed is used primarily, and in 2-line crosses of ducks the Pekin breed is used.

Crosses of poultry used for meat have been selected for a high growth rate in the young. At 7-8 weeks old broiler cross chickens weigh 1.5-1.7 kg; at 12

weeks hybrid turkeys weigh 4.0-4.5 kg; and at 7 weeks ducks weigh 2.8-3.1 kg. At 8 weeks geese weigh 3.8-4.3 kg.

Selection work to create our own crosses of egg-laying chickens, and work on testing and introducing them into production, is done by a number of the country's scientific institutions in conjunction with special experimental farms and industrial breeding enterprises. The Selection Center at the All-Union Poultry Breeding Scientific Research and Technology Institute and specialists at the "Marx" industrial breeding enterprise in Saratov Oblast created "Start", the first Soviet cross, with an egg-laying capacity of 270 eggs per hen. The Belorussian Regional Experimental Poultry Breeding Station developed the "Belarus'-9" cross and is continuing its work on the "Volga-3" cross. The Ukrainian Poultry Breeding Scientific Research Institute, in conjunction with specialists at the industrial poultry breeding enterprises imeni Chkalov in Donetsk Oblast and imeni Fabricius in the Latvian SSR, and the Latvian Animal Husbandry and Veterinary Sciences Scientific Research Institute developed the "Yantar'-1" cross. Specialists at the "Nagornyy" industrial poultry breeding enterprise in Leningrad Oblast and the "Ptichnoye" enterprise in Moscow Oblast, under the supervision of scientists from the Leningrad Agricultural Institute and the Selection Center of the All-Union Poultry Breeding Scientific Research and Technology Institute, worked on the "Zarya-17" cross. The Ukrainian Poultry Breeding Scientific Research Institute developed the "Borki-1" and "Borki-2" 2-line crosses of chickens with an egg-laying capacity of 245-250 eggs per hen.

The hybrid hens of these crosses have genetically-determined, high egg-laying capacities. Under optimal conditions of care, the average annual egg output is 250-270 eggs per hen. At the "Vevisskaya" and "Giryale" industrial poultry enterprises in the Lithuanian SSR, where the "Zarya-17" cross is used, over 270 eggs per year are obtained per hen. At the Tallinn Industrial Poultry Enterprise the egg-laying capacity of the "Yantar'-1" chickens is over 260 eggs per hen; and at the Minsk Production Association, an average of 256 eggs per hen were obtained from a flock of 1.7 million chickens in 1981.

In the production of broilers the "Broyler-6" domestic cross is used mainly; it was developed as a result of joint work done by the Selection Center of the All-Union Poultry Breeding Scientific Research and Technology Institute, the All-Union Animal Breeding and Genetics Scientific Research Institute, and the "Konkursnyy" and "Smena" industrial poultry breeding enterprises in Moscow Oblast and the "Bol'shevik" industrial poultry enterprise in Leningrad Oblast.

At the country's best industrial poultry breeding enterprises broiler chickens weigh between 1.6 and 1.8 kg, and the average daily weight gain is over 25 g. For example, at the Vilnius industrial poultry farm in the Lithuanian SSR the average daily weight gain in broilers is over 30 g; at the "Druzhba" industrial poultry farm in Brest Oblast the average daily weight gain is 27 g; and at the "Dzerzhinskiy" farm in Minsk Oblast it is 25 g. It should be pointed out that the genetic potential for weight gain among chickens of this cross up to 7 weeks old is high and at certain industrial farms it reaches 32 g and higher.

Ducks used for meat production are primarily those of the "Medeo" cross developed at the Kazakh Regional Experimental Poultry Breeding Station and the

"Temp" cross developed at the Belorussian Regional Experimental Poultry Breeding Station.

Turkey crosses developed domestically (at the Ukrainian Poultry Breeding Scientific Research Institute and the North Caucasus Regional Experimental Poultry Breeding Station) and the "Hidon" acclimatized cross developed by the "Eurobrid" company (in the Netherlands) are used in meat production.

Parent forms for geese used in meat production are primarily the Rhine, Italian, the large gray, and the Gorky and Ukrainian gray breeds. Geese of the Rhine and Italian breeds are imported from abroad. After acclimatization, a great deal of work was done on their expanded reproduction and selection.

In our country today chicken broiler crosses are the primary poultry raised for meat. Future plans also call for broiler chickens to account for at least 70 percent of the poultry raised for meat. The remaining 30 percent will be broiler breeds of ducks, turkeys, geese, guinea-fowl, and mature egg-laying hens at the end of their productive egg-laying period.

During the current five-year plan scientific research and selection work is aimed at further improvements in the economically beneficial properties of the crosses of poultry named above, as well as at creating new forms of poultry adapted to conditions of industrial technology. In selection work on egg-laying chickens, research tied to improving their over-all resistance is given top priority.

Contemporary crosses of poultry being used in our country's industrial farms are characterized by a high intensity of egg-laying (70 percent) based on the average per hen, but relatively low indicators of egg-laying capacities based on the original population of chickens. The differences in these indicators at many farms may be 30 eggs or more, which is a result of a higher loss of poultry (illness, forced withdrawal) during the egg-laying period, especially during the first half of this period. The development of lines and crosses of poultry with a high general resistance is being carried out in two ways. The first method is direct selection of the original population of chickens for their egg-laying properties, which will help improve the over-all health of the poultry, that is, individuals should be selected with a high general resistance and the lines should be established with high, genetically determined productivity. The second method is based on a study of immunological indicators that describe the level of natural resistance (the opsonin-phagocytic reaction, the blood's bactericidal activity, the protein spectrum of the blood serum), and use of the hypophyseal-adrenal system's response to measured stress at an early age. As a result of this research, plans are being made to develop tests for evaluating and selecting individuals with higher general resistance. The final goal of this work is to create crosses with an egg-laying capacity of 250-255 eggs per year based on the original population of chickens. It should be pointed out that a number of scientific research institutes have already developed lines like this, evidence of which can be seen in the results of international tests conducted on poultry in the GDR. From the 3 2-line forms produced by the Selection Center of the All-Union Poultry Breeding Scientific Research and Technology Institute, the Belorussian Regional Experimental Poultry Breeding Station, and the Kazakh

Regional Experimental Poultry Breeding Station, 264.4, 259.8, and 251.1 eggs per original hen were obtained, respectively, over 500 days of the chickens' lives.

Lengthening the amount of time that hybrid hens can be used is also very important in the selection work being done on egg-laying chickens. Today hens at industrial poultry farms in our country are used for about 11 months. Keeping hens longer than this is not efficient because there is a decline in their egg-laying capacity. Research done in our country and abroad indicates that it is possible to select chickens for longer periods of egg-laying productivity. Large foreign firms are already using this type of poultry. An example of such a firm is the "Eurobrid" company (in the Netherlands), which supplies the "Hysex white" cross to the international market; these hens have an egg-laying period of 14 months (with an 82-week life) and the egg-laying productivity based on the original population is 307 eggs, and the average for the population is 327 eggs.

Work in this direction has been started in our country. In the current five-year plan the Belorussian Regional Experimental Poultry Breeding Station will create a line of chickens with an intensive (70 percent) average egg-laying capacity for 13 months of productivity (with a 78-week life). Breeding of these lines is based on selection of chickens with a high egg-laying capacity in the last 2-3 months of their productive period. Work is also continuing on developing a cross of hybrid chickens with extended productivity periods. The All-Union Animal Breeding and Genetics Scientific Research Institute is working on the development of a cross with a capacity of at least 750 eggs over 3 years when chickens are kept in cages.

It is possible to increase chickens' egg-laying capacity only by accelerating their sexual maturation. High-productivity egg-laying chickens reach sexual maturity at an age of 161-165 days. According to data from 9 tests on egg-laying chickens at the International Experimental Poultry Breeding Station in the CSSR, the average age at which 16 crosses attained sexual maturity was 166 days. Crosses of chickens from the USSR reached sexual maturity 1-3 days later. Therefore, the special program for 1981-1985 includes research (to be done by the West Siberian Regional Experimental Poultry Breeding Station and the Ukrainian Poultry Breeding Scientific Research Institute) to develop lines and crosses of chickens with full sexual maturity at 155-160 days.

The development of lines of chickens characterized by early sexual maturity makes it necessary to expand work being done to determine the optimal weight of chickens at the beginning of their egg-laying period and their physiological maturity. When chickens that are not yet physiologically mature attain early sexual maturity (which can be accomplished through technological methods), their egg-laying capacity is disturbed and there is a higher loss of hens during the intensive egg-laying period. As a rule, eggs from these hens are low in weight. In connection with this, during the current five-year plan research has been started, and will be continued in the future, to study in more depth the physiological condition of hens prior to the egg-laying period. This will make it possible to answer some questions of forecasting productivity and viability of the poultry and to determine indirect indicators that could be included in the selection program.

The development of lines and crosses of poultry with high indicators for health and egg-laying productivity also includes the goal of increasing egg weight. In crosses of chickens with an egg-laying output of 250-255 eggs based on the original population, the average egg weight should be at least 59-60 g. At the International Poultry Breeding Control and Testing Station (in the CSSR), the weight of eggs from the crosses tested was 61 g (for white-shelled eggs) and 63 g (for brown-shelled eggs). Among crosses (or forms) of chickens from the USSR this indicator was 1-2 g lower.

The average weight of eggs can be increased not only by increasing the weight of adult chickens, but also by increasing this indicator during the first months of the egg-laying period. For example, the Kazakh Regional Experimental Poultry Breeding Station is creating a line of chickens that produce eggs weighing 52 g when they reach 50 percent of their egg-laying capacity. Contemporary lines and forms of egg-laying chickens produce eggs with an average weight of 47-49 g when they reach 50 percent of their egg-laying capacity.

It should be pointed out, however, that increasing the average egg weight is a fairly complex task. It is well known that heterosis involving this indicator is very low or nonexistent among hybrids. Therefore, selection must be carried out to create lines with a high egg weight. This can be achieved by increasing egg weight both during the first months of the egg-laying period and during the last months of the egg-laying period; the latter approach is not altogether desirable, since the higher the egg weight among chickens durng the last months of productivity, the lower the egg output and the higher the yield of irregular eggs that are not suitable for incubation. The following must also be pointed out: there is a positive correlation between the average egg weight indicators and their variability, and when selection is performed to increase average egg weight, there is an inevitable increase in the variability of this indicator. A number of investigators have determined that when chickens exhibit a high degree of variability in their egg weight, the output of incubation eggs is lower because of a high percentage of small and large eggs that are unsuitable for incubation[1]. Thus, the need arises to carry out more in-depth research to determine the optimal egg weight for chickens producing eggs at different ages.

In addition to raising the average egg weight, further improvements should be made in lines and crosses of egg-laying chickens with regard to improving the quality of the eggshell. Unfortunately, there is still a high percentage of breakage when chickens are kept in cages. Toward the end of the reproductive period the thickness of the shell steadily decreases. This is a consequence of the fact that when chickens reach the peak of their egg-laying period, the calcification capacity of the womb reaches its maximum, and egg weight increases during the second half of the reproductive period and the same amount of calcium is distributed over an expanding egg surface. Thus, selection should be aimed, on the one hand, at intensive development of the oviduct during sexual maturation, and on the other hand, at preventing excessive increases in the chickens' body weight and egg weight during the second half of the reproductive period.

It should be noted that today not enough is known about the biochemistry of eggshell calcification and the natural principles of the function of the bone marrow in supporting the general homeostasis of calcium in the bodies of high-productivity hens. In high-productivity hens kept in cages one often sees the "cage fatigue" syndrome--a disruption in productivity or even death as a result of their inability to maintain the necessary level of ionized calcium. It is well known that calcium ions participate in the regulation of practically all the most important biological phenomena: muscular activity, nervous conduction, cell division, secretory processes, vision, etc. Therefore, the stability of calcium homeostasis is almost synonymous with the stability and viability of the chicken itself. The process of eggshell calcification is integrated with the life of the chicken.

Currently the Selection Center at the All-Union Poultry Breeding Scientific Research and Technology Institute is conducting research is determine the basic biochemical mechanisms that control eggshell calcification. A great deal of attention is being focused on studying the dynamics of ionized calcium in the blood during the course of the ovulatory cycle. By using contemporary ion-selective techniques, it has been determined that the earlier notion of significant stability and constancy of ionized calcium in the blood of chickens is wrong. During the reproductive period in chickens, there is marked ionic hypercalcemia, which reaches a maximum point just before calcification of the eggshell[2]. Therefore the development of methods to evaluate and select chickens on the basis of this indicator will also help to increase the quality of eggs and the egg-laying capacity of chickens.

An increase in the effectiveness of selection work to improve eggshell quality can be achieved by developing more precise methods to evaluate this characteristic. Research done at the All-Union Poultry Breeding Scientific Research and Technology Institute indicates that the selection of chickens for reproduction of the next generation with improved egg qualities should be done according to indicators of eggshell quality in eggs that are formed over the course of 24-25 hours during the peak egg-laying period[3].

An increase in the economic effect of utilizing crosses can be achieved by implementing selection that is directed at reducing feed costs per 10 eggs or per 1 kg of egg weight. The West Siberian Regional Experimental Poultry Breeding Station is working on the development of lines of this sort. Research being done at the Far Eastern Regional Experimental Station and the Siberian Animal Husbandry Scientific Research Planning and Technology Institute showed that feed consumption per unit of production can be reduced by determining the optimal weight for the adult chicken or by utilizing chickens that carry the dwarf gene (dw). It is well known that the more the chicken weighs, the greater the demand for food to sustain the body's vital functions, and expenditures on feed account for 60 percent or more of the production costs. Therefore, many foreign firms include the chicken's body weight as an indicator in their selection programs[4]. However, because of the positive correlation between the chicken's body weight and the weight of the eggs, the reduction in body weight is relatively limited. Utilization of chickens carrying the dw dwarf gene makes it possible to reduce significantly the chicken's body weight. The dw gene is recessive and sex-linked and reduces body weight by 30-35 percent; in egg-laying chickens this gene also causes a reduction in egg-laying

capacity[5]. However, the All-Union Poultry Breeding Scientific Research and Technology Institute has now obtained a group of egg-laying mini-chickens with an egg-laying capacity of 240-260 eggs with life span of 68 weeks; these eggs weigh 60-61 g when the hens are 1 year old[6]. Thus, as a result of selection of mini-chickens, lines can be developed with relatively high egg-laying properties, and the utilization of these lines as paternal forms will make it possible to obtain hybrid mini-hens with a good production return on feed--2.3-2.4 kg of feed per kg of egg weight. Research done at the Ukrainian Poultry Breeding Scientific Research Institute established the possibility of utilizing mini-chickens as the maternal parent form. In this case the production cost of eggs from hybrid hens based on all expenditures (on young and adult chickens from parent and industrial flocks) will be substantially lower.

The economic effect of using the egg-laying mini-chickens comes not only from conserving feed, but also from increasing the output of eggs per unit of cage floor space, since the low body weight of the mini-chickens (1.3-1.4 kg) makes it possible to increase the density of the quarters by 30 percent or more. Therefore, even with the lower egg-laying capacity of these chickens the egg output will be higher. All this proves the economic effectiveness of utilizing mini-chickens[7].

Over the last decade a great deal of work has been done abroad to develop and introduce into production autosexing crosses of chickens that lay brown eggs. Synthetic lines, developed by using chickens that produce both meat and eggs, are the basis for these crosses.

The use of a paternal form carrying the golden gene (s) and a maternal form carrying the silver gene (S) in crosses, makes it possible to obtain hybrid male and female chicks with different colored down when they are just one day old. Practically every company engaged in selection is working on crosses like this. The "Dekalb", "Hubbard", "Shaver", "Eurobrid", and many other companies have obtained good results in this area. In recent years selection specialists at these firms have done a great deal of work to reduce chickens' body weight and to improve their egg-laying qualities. Therefore, the egg-laying qualities in chickens of these crosses are almost the same as in the white leghorn chickens, which have a higher body weight. For example, the egg-laying output of the "Hysex Brown" cross chickens (from the "Eurobrid" company) over a 13-month egg-laying period is 281 eggs based on the original population and 296 eggs on the average, with an average egg weight of 62.7 g; the output of the B-380 (Babcock) cross is 285 and 300 eggs. The weight of these chickens at the end of the egg-laying period is 2.2-2.3 kg.

Research has been started in our country to develop crosses of this type using domestic and imported genetic material. At the All-Union Poultry Breeding Scientific Research and Technology Institute, the Ukrainian Poultry Breeding Scientific Research Institute, and the Transcaucasian Regional Experimental Poultry Breeding Station, research is being done on chickens with ordinary body weight and on mini-chickens that are carriers of the golden gene (s), the silver gene (S), and the striped gene (B). There are plans to develop a 4-line autosexing cross of hybrid hens with ordinary body weight and an egg production of at least 245 eggs per original hen; the eggs from these chickens should

weigh 62 g. Furthermore, autosexing crosses will be developed in which mini-chickens will be the paternal or maternal parent form. The Belorussian Regional Experimental Poultry Breeding Station is working on the development of an autosexing cross of chickens with an ordinary body weight, using chickens that carry the dominant gene for slow feather growth (K). Crossing such chickens with roosters that carry the recessive gene for rapid feather growth makes it possible to obtain male chicks with slow feather growth and female chicks with rapid feather growth; this in turns makes it possible to separate day-old chicks by sex judging by the condition of the wing and covert feathers.

The basic direction in the selection work being done on chickens used for meat is further acceleration in the growth rate of young chickens and increasing the yield of chicks from parent and original parent flocks. The collectives of the All-Union Poultry Breeding Scientific Research and Technology Institute, the All-Union Animal Breeding and Genetics Scientific Research Institute, and the Baltic Regional Experimental Poultry Breeding Station, who are working on this type of poultry, are faced with the task of developing a cross with a body weight of 1.75-1.8 kg at 7 weeks of age, and with feed consumption of 2.0-2.1 kg per kg of weight gain. In the process of this research a great deal of attention is given to stepping up the growth rate among young chickens with a paternal parental form. The body weight of line offspring of this form should be 1.7 kg at 6 weeks of age. It should be pointed out that lines have already been developed that make it possible to obtain broilers with a high body weight. Evidence of this can be seen in the results of control tests on poultry. For example, at 7 weeks 2-line broilers from the West Siberian Regional Experimental Poultry Breeding Station weigh 1.76 kg and the consumption of feed per kg of weight gain is 2.24 kg.

Research being done by the West Siberian Regional Experimental Poultry Breeding Station and the Ukrainian Poultry Breeding Scientific Research Institute is aimed at developing maternal parent forms with high reproductive qualities--120 broiler chicks per hen, with a 60-62 week life span. This problem is being resolved by carrying out selection for increasing egg-laying capacities among chickens with maternal parent forms, and for increasing the output of incubation eggs from these hens. Technology is being developed that will help determine the chickens' maximum egg-laying capacity. This can be achieved by regulating their body weight and sexual maturation. Since the output of broiler chicks depends to a significant degree on the hatching percentage, work is also being done to increase the reproductive qualities of roosters of the paternal parental form by carrying out selection for improved fertilization capability of the sperm and prolonging the duration of the roosters' use.

With the aim of increasing the efficiency of producing broiler meat, research is being done to increase the output of eggs and chicks per square meter of space in the chicken facilities and to reduce the consumption of feed per unit of production, that is, per incubation egg and per kg of weight gain. Parental forms are being developed that are adapted to living in cages and maternal parent forms are being developed with a low body weight and autosexing offspring.

To develop crosses of chickens that are adapted to living in cages, the All-Union Poultry Breeding Scientific Research and Technology Institute is

using chickens with ordinary body weight and meat mini-chickens for the parental forms. For example, the "Broyler-Kompakt-8" cross is being developed using chickens with ordinary body weight as the parental form. The maternal parental form of mini-chickens is substantially different from that of chickens with ordinary body weight. The recessive, sex-linked dwarfism dw gene causes a 28-32 percent decline in body weight, which in turn makes it possible to bring about significant reductions in the amount of feed used to raise young chickens and to maintain the adults (a 22-27 percent reduction). The egg-laying capacity of these chickens is the same as that of chickens with an ordinary body weight[8]. The body weight of broiler chicks obtained from mini-chickens is approximately the same as that of broilers of contemporary industrial crosses. When cornish roosters with ordinary body weight are crossed with meat mini-chickens, sons and daughters are obtained that are heterozygous in terms of the dw gene; the sons are Dwdw and the daughters are lacking the gene. The body weight of the heterozygous male broiler chicks is 20-50 g lower than that of broilers obtained from chickens with ordinary body weight. However, as a result of the lower production cost of the day-old broiler chicks obtained from the mini-chickens, they are more efficient economically. Recently all the leading firms in the majority of European countries, the United States, and Canada have crosses in which meat mini-chickens are the maternal parental form. At 7 weeks the body weight of broilers of this cross is high--1.9-2.0 kg and feed consumption per kg of weight gain is 1.92-2.04 kg[9]. Work is also being done at the Ukrainian Poultry Breeding Scientific Research Institute and the All-Union Animal Breeding and Genetics Scientific Research Institute to develop crosses of chickens with ordinary body weight that are adapted to living in cages. The All-Union Poultry Breeding Scientific Research and Technology Institute and the Ukrainian Poultry Breeding Scientific Research Institute are using chickens with ordinary body weight and mini-chickens as the basis for research to develop autosexing maternal parental forms by using chickens that carry the gene for slow feather growth (K) and the golden and silver genes (s, S).

During the current five-year plan the Baltic Regional Experimental Poultry Breeding Station is developing lines of meat chickens with a high content of vitamin B_2 in their eggs and with intensive embryonic development. The All-Union Animal Breeding and Genetics Scientific Research Institute is working to develop broiler crosses whose meat will have a higher protein content (23-24 percent).

The basic emphasis of the work being done to improve existing crosses of ducks and to develop new crosses is to speed up the weight gain in 7-week old ducklings of the paternal parental form and to increase the reproductive qualities of the maternal parental form (180 eggs per original hen). In addition to developing these crosses, the Kazakh Regional Experimental Poultry Breeding Station, the Belorussian Regional Experimental Poultry Breeding Station, and the Ukrainian Poultry Breeding Scientific Research Institute are conducting research to reduce the fat content in ducks, that is, to improve the quality of the duck meat. This task is being accomplished by using local populations of ducks with a low rate of weight gain among the young, but also with a low fat content (18-20 percent), and also by using Muscovy ducks as the paternal parental form. Moscovy ducks are characterized by high-quality meat and when crossed with ducks that have a rapid rate of weight gain, they produce

offspring (mullards) with a low content of body fat. However, the reproductive properties and intensity of weight gain in Muscovy ducks are low, therefore a need has arisen to develop crosses of ducks with a longer fattening period for mullards, but with high-quality meat.

The basic directions in selection work on turkeys are the same as those for meat chickens: increasing the rate of weight gain in the young, improving the reproductive qualities of the maternal parental form, and developing crosses that are adapted to living in cages.

The North Causcasus Regional Experimental Poultry Breeding Station and the Ukrainian Poultry Breeding Scientific Research Institute have set themselves the goal of developing crosses that at 12 weeks of age have a body weight of 4.0-4.5 kg, and at 17 weeks, 7 kg; in addition to heavier crosses with 23 week-old males weighing 11 kg. These collectives are working to develop a maternal parental form with a high yield of poults (40-45) from each hen of the parent flock. The problem of increasing the yield of poults is being resolved by increasing the egg-laying capacity of turkey hens and the hatching of poults. Today incubation eggs are obtained from turkey hens by means of artificial insemination, therefore there is also a need to improve sperm production by turkey cocks and to improve a number of technological methods involving artificial insemination. Work is being done (by the North Caucasus Regional Experimental Poultry Breeding Station) to develop lighter parental forms with strong constitutions that can be kept in groups of cages. At 10-11 weeks old, hybrid poults of this cross weigh at least 2.5 kg, with 2.3-2.4 kg of feed consumed per kg of weight gain.

Selection work with geese is aimed at developing lines that will be used to form 2 and 3-line crosses with a high rate of weight gain in the young; at 8 weeks the geese should weigh 4.5 kg and one goose should produce 30-35 offspring. Italian, Rhine, and the large gray breeds are being used in this work.

In addition, selection work with geese is aimed at creating parental forms that will produce geese to be force-fed for use of their liver, with a weight of 400-450 g. The question of using autosexing in goose breeding is also being resolved.

With the aim of increasing the assortment of poultry meat, research is being done at the All-Union Poultry Breeding Scientific Research and Technology Institute to create a cross of guinea fowl that is adapated to being kept in cages. At present 3 lines are being developed: one with a higher egg-laying capacity, one with a higher growth rate in the young; and one with high-quality meat. It should be mentioned that in order for the country's selection specialists to meet the goals that have been set before them, they need a wide range of genetic material for all types of poultry. In connection with this many scientific research institutions have at their disposal gene-pool flocks with reserve lines, breeds, and populations that have not undergone intensive selection. The All-Union Poultry Breeding Scientific Research and Technology Institute has gene-pool flocks of chickens and geese; the Belorussian Regional Experimental Poultry Breeding Station has such a flock of chickens; the Kazakh

Regional Experimental Poultry Breeding Station has a flock of ducks for this purpose; and the North Caucasus Experimental Station has a flock of turkeys.

When discussing the development of crosses of high-productivity poultry adapted to conditions of industrial technology, in addition to the prospects for selection, one should stress that investigators often lose sight of a number of methodological and theoretical issues. Specifically this concerns methods used to choose indicators for selection and evaluation methods. With the aim of improving genetic progress, it is necessary to evaluate an indicator precisely at the age when by virtue of the biology of development, the body has the greatest variability, which expands the possibilities for selecting desirable genotypes.

The conditions under which the evaluations are made are also quite important. We should emphasize especially the wisdom of evaluating poultry under "provocative" conditions, in stressful situations, which makes it possible to reveal genotypes with increased adaptability to the conditions of industrial technology. The need for stress-resistant poultry will be felt more and more as poultry breeding becomes more intensive[10].

A great deal of importance is being assigned to genetic research with a physiological and biochemical slant, which makes it possible to answer questions concerning the relationship between processes of synthesis and break-down of muscle proteins, and the variability and hereditary nature of this characteristic, which will make it possible to develop selection programs aimed at increasing efficient utilization of feed and developing fundamentally new lines and crosses of chickens that are capable of exhibiting high meat productivity on low-calorie and low-protein diets.

The reason for production of defective eggs (without shells, with soft shells, with two yolks, improperly shaped) must be determined. During the first 2-3 months of the egg-laying period the number of defective eggs among meat chickens ranges between 2 and 20 percent, and among egg-layers, between 3 and 7 percent of the total number of ovulations.

The industry also suffers great losses due to so-called "internal egg-laying", that is, the ovulation of follicles not in the oviduct but within the body cavity. This causes the loss not only of formed egg yolks, but of the entire egg. It is thought that the cause of this phenomenon is simultaneous development and ovulation of more than one follicle under the influence of increased secretion of gonadotropins by the hypophysis. Therefore, experimental study of the mechanisms for inhibiting superovulation during the first 2-3 months of the egg-laying period is an immediate task for selection specialists and physiologists, both in theoretical and practical terms.

The genetics and selection of future poultry breeding are being developed today. Geneticists are directing immense efforts at clarifying the intrinsic mechanisms that control genetic mutability and the molecular foundations of macroevolution. Today the preconditions are being created which will make it possible in the future to "design" new types of poultry.

Research in the area of artificial mutagenesis is aimed primarily at its specificity, and the future here probably belongs to chemical mutagens, which cause reorganization of chromosomes and genomes. One of the leading directions in experimental genetics is genetic engineering. Methods and concepts in this field of genetics will probably play a central role in the complex system of future "designing" of new genotypes. Cellular engineering is undergoing intensive development in plant growing today. Work on animal cells has already been started as well. For example, in livestock breeding the use of the superovulation method and artificial insemination makes it possible to transplant zygotes from high-productivity cows to the wombs of less productive recipient cows, and thus to obtain not one, but several calves per year. This method is not suitable for poultry breeding, since an egg is not an embryo, and not a zygote. However, at various stages of egg formation up to a certain stage of development of the chicken embryo, its separate cells, or blastomeres, are totipotent, that is, they are like zygotes under corresponding conditions in that they are capable of producing a new organism. This makes it possible to obtain clones of poultry with absolutely identical genotypes. These clones, obtained from the most productive individuals, are the most valuable genetic selection material for creating matching lines that can be used to obtain crosses with a high level of heterosis.

One cloning method involves asexual reproduction or parthenogenesis. For a number of years the Genetic Foundations of Selection Laboratory at the All-Union Poultry Breeding Scientific Research and Technology Institute has been working on artificial ameiotic parthenogenesis which would make it possible to preserve genotypes of chickens with maximum productivity. This type of parthenogenosis makes it possible to regulate at the same time the sex of the offspring, that is, to obtain only females. It is now possible to carry out in vitro parthenogenesis development of unfertilized sexual cells up to the stage of several hundred cells. The development remains, however, at the stage of differentiation and organogenesis.

The need to continue this work is dictated by its exceptional importance for industrial poultry breeding--the possibility of providing the industry with a calibrated "standard" chicken with high productivity, an identical demand for feed, adapted to industrial technology, and disease-resistant.

By carrying out the special integrated program for poultry breeding, collections of scientific institutions are making their contribution to fulfilling the USSR Food Program--the main direction of the CPSU's economic policies in the 11th Five-Year Plan and in the future.

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CSO: 1840/1057

UDC 575.1:582.282.23

DECREASE IN SPONTANEOUS rho$^-$ MUTABILITY IN YEASTS WITH CHROMOSOME IV DISOMY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 275, No 4, Apr 84
(manuscript received 25 Nov 83) pp 1022-1024

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[Abstract] Nuclear and mitochondrial genetic interactions were studied in a saccharomycete system, using the p^- factor, an unstable pleiotropic genetic factor. This factor is responsible for decrease in pigmentation of adenine-dependent mutants, decreases the frequency of rho$^-$ spontaneous mutations and, in the homozygotic state, block sporulation. Crossing of p^- and p^+ lines and analysis of the progeny showed that p^- was closely linked to the centromere but not to any of five analyzed pericentric markers and, consequently, to none of the chromosomes (arg-VIII, leu-VII, met14-XI, rad1-XVI, ura3-V). However, p^- was associated with chromosome IV and appears to represent chromosome IV disomy. Since the rate of spontaneous mutations was significantly higher in p^+ clones than in p^- clones (5.9 vs. 1.4%), while the rate of spontaneous formation of lethal sectors was identical, it appears that chromosome IV disomy decreases the rate of spontaneous mitochondrial rho$^-$ mutations. References 4: 3 Russian, 1 Western.
[635-12172]

UDC 577.17

SPERM WHALE LUTEINIZING HORMONE: ISOLATION, RESOLUTION INTO SUBUNITS AND AMINO ACID SEQUENCING OF α-SUBUNIT

Moscow BIOKHIMIYA in Russian Vol 49, No 1, Jan 84 (manuscript received 25 Apr 83) pp 111-126

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[Abstract] Standard techniques of peptide chemistry were utilized for the isolation, resolution into subunits, and amino acid sequencing of sperm whale luteinizing hormone (LH) α-subunit. These studies were undertaken to provide a more complete picture of the variations in hypohyseal hormones of mammals, particularly so in view of the fact that the sperm whale hormones differ markedly from other mammals. The α-subunit was determined to consist of 96 amino acids with carbohydrate side chains at asparagine moieties in positions 56 and 82. The C-terminus of this subunit consists of serine, while the N end consists predominantly of phenylalanine, but with certain chains identified to contain threonine or proline at the N-terminus. Figures 7; references 22: 6 Russian, 18 Western.
[1501-12172]

MEDICINE

UDC: 616.24-002-092.4/.9:546.13/.18

DISTINCTIONS OF EXPERIMENTAL PNEUMONIA RELATED TO EXPOSURE TO CERTAIN TOXIC ORGANOCHLORINE AND ORGANOPHOSPHORUS CHEMICALS

Kiev VRACHEBNOYE DELO in Russian No 4, Apr 84 (manuscript received 5 Jul 83) pp 100-103

[Article by V. V. Biktimirov, Department of Pathological Anatomy (headed by Prof Ye. I. Makovskaya), Vinnitsa Medical Institute]

[Text] In the early 1950's, the problem of nonspecific inflammatory lung diseases (NILD) appeared to be solved because of the advances in antibacterial therapy. However, at the present time, the dynamics of indicators of morbidity, severity and outcome of respiratory organ diseases are unfavorable. Thus, according to the data of G. B. Fedoseyev (1976), V. P. Sil'vestrov (1981), A. N. Zelinskiy, A. F. Frolov (1981) and A. K. Ageyev (1982), morbidity and mortality referable to acute pneumonia increased and are at a high level. In the literature of recent years, there have been frequent reports of protracted course of such diseases, with rapid development of pneumosclerosis and bronchiectases, suppurative complications being encountered often (V. P. Sil'vestrov, 1981; A. I. Kleyner, V. A. Yefremov, 1981; Ye. F. Chernushenko, V. N. Molotkov, 1982).

Among the numerous causes of NILD, a significant place is given to changes in immunological reactivity of the body and effects of environmental factors. Pesticides are widespread in the environment (L. I. Medved', 1977). They have a deleterious effect on the function of different systems of the body and, in particular, immunogenesis (A. I. Olefir, 1978).

It has been observed that the incidence of diseases of respiratory organs, cardiovascular system and digestive tube has risen in areas of intensive use of pesticides (V. P. Bezuglyy, 1981; Yu. S. Kagan, 1981).

Our objective here was to determine the histological and morphological distinctions of the pneumonic process in the case of exposure to the pesticides, polychlorpinen and carbofos.

This study was conducted on 300 white rats. The animals were divided into six groups, four experimental and two control. The first two groups of rats were given PCP [polychlopinen] intragastrically in doses of 3.5 mg/kg and 0.35 mg/kg (350 mg LD_{50}) daily for 3 and 10 months. The other two groups were given carbofos for the same period of time in doses of 8 mg/kg and 0.80 mg/kg (LD_{50} 800 mg/kg). Control series of animals were given tap water.

Pneumonia was produced by the method of Z. I. Gol'zand (1955). Virulent strain No 39 of Kl. pneumoniae (Friedlander's bacillus) was used to infect the animals. In addition to traditional histological stains, we used electron microscopy, as well as histochemical techniques for demonstration of fibrin, glycosamino-glycans, alkaline and acid phosphatases, succinate dehydrogenase (SDH), lactate dehydrogenase (LDH), glucose-6-phosphate dehydrogenase (G-6-P). We tested phagocytic activity of white cells and serum lysozyme activity in blood of experimental animals by conventional methods.

On the basis of the clinical and morphological signs, we could distinguish four periods in the genesis of pneumonia in the control group of animals: initial, height of process, resolution and recovery. Signs of inflammation were demonstrated as early as 3-6 h after intratracheal administration of the culture, and they were manifested by alterative changes in stromal and parenchymatous elements of the organ. Bronchial epithelium became swollen and, in some places, separated from the basement membrane. By the end of the first 24 h, there was partial desquamation, while the remaining epithelium showed an increase in activity of alkaline phosphatase, LDH and G-6-P, with decrease in SDH activity. The basement membranes became enriched with nonsulfated glycosamino-glycans of the chondroitin sulfate type. Intensity of staining of collagen fibers was reduced in bronchial and vascular walls.

The epithelial lining of the aerohematic barrier retained its continuity. Microvilli were demonstrable on the surface of large alveolocytes, some of which were destroyed. Mitochondria and lamellar cell bodies retained their structure. Pulmonary macrophages contained numerous lysosomes and phagocytized microorganisms, some of which were destroyed. At the same time, there were exudative processes: pulmonary vessels were hyperemic with marginal location of leukocytes. The endothelial capillary cells were swollen, numerous pinocytotic blebs appeared in their cytoplasm, SDH activity diminished and there was greater demonstration of alkaline phosphatase. The walls of the vessels and paravascular connective tissue were loosened by edematous fluid, in which neutrophil leukocytes and lymphocytes were demonstrable. By the end of the first 24 h, the bronchial and alveolar lumen in the region near the root was filled with serous and supporative exudate. On the 2d-3d days, the inflamed foci merged and occupied one-third to one-half of a lobe. In these areas, the alveoli were filled with exudate, which contained in the center polynuclear leukocytes, fibrin and isolated macrophages and, on the periphery, serous fluid and numerous Gram-negative bacilli.

After 3 days, there was attenuation of exudative processes. There was an increase in number of macrophages in the alveoli, which actively engulfed bacteria, and fibrin. On the 5th day there was resolution of pneumonia: microbial edema disappeared, the exudate was macrophagal and no bacteria were demonstrable in lung tissue. By this time, there was decrease in activity of enzymes of the anaerobic cycle of glucose oxidation in lung tissue. There was activation of proliferative reactions. The interalveolar septa became thicker due to accumulation of lymphocytes, histiocytes and epithelioid cells. The bronchial epithelium was restored throughout, and SDH activity increased in its cytoplasm. Lymphocyte and histiocyte accumulations were found around the bronchi and vessels in the form of cuffs, with zonal arrangement of lymphoid cells that reacted to acid and alkaline phosphatases. After 12-15 days, the pulmonary parenchyma was entirely free of exudate and, by the 20th day, its structure was restored.

At the early stage and, particularly, at the height of pneumonia, there was drastic increase in lysozyme activity. During the period of resolution of pneumonia, its parameters dropped but reverted to normal by the 20th day. Phagocytosis was on a high level at all stages of pneumonia.

In animals given PCP in advance, the morphogenesis of pneumonia was similar, but inflammatory changes were more marked, even in animals infected with 1/1000 LD_{50}. The first signs of inflammation were demonstrable in the rats 3-6 h after infection, as in control animals. However, there were more profound alteration processes. The bronchial epithelium became swollen, its cytoplasm underwent vacuolization and contained considerable amounts of acid and alkaline phosphatases. The walls of the bronchi and vessels were profusely infiltrated by glycosamino-glycans and were loosened by edematous fluid. Collagen fibers took up the stain poorly, and there was lysis of elastic tissue.

Fibrin and pulmonary macrophages were demonstrable in the alveolar lumen, with numerous phagocytized bacteria, the structure of which was preserved. Vacuoles were formed in areas with lysosomes, which was indicative of considerable discharge of proteolytic enzymes. Destruction of cristae and homogenization of the matrix were found in some mitochondria of large pneumocytes. There were signs of discharge of lamellar bodies into the alveolar lumen.

By the end of the first 24 h, the bronchial epithelium was separated from the basement membrane. There was a considerable amount of LDH in the preserved epithelium. Reticulated fibers were poorly impregnated. There was marked marginal location of leukocytes in vessels. SDH activity diminished in endothelial cells. There was activation of endotheliocyte surface: formation of processes, villi and, occasionally, deep invaginations of cytoplasm with numerous pinocytotic vesicles.

The vascular wall and, in particular, paravascular connective tissue, were saturated with plasmatic fluid containing leukocytes and erythrocytes. The alveoli were filled with serous-suppurative and suppurative-fibrinous exudate with a hemorrhagic component. Some animals died on the 2d day. Histological examination revealed that the inflammatory process involved several lobes. Suppurative panbronchitis was observed. The lumen of alveoli was filled with mucous-suppurative, fibrinous-suppurative and hemorrhagic exudate. The interalveolar septa became thinner and could only be surmised according to plethoric capillaries. After 3-5 days, the exudative processes became stabilized. The foci of inflammation grew larger, and small abscesses appeared.

There was a breakthrough in the process on the 7th-9th day. Macrophages appeared in the exudate, the zone of microbial edema disappeared and there was more intensive intraalveolar phagocytosis. However, even on the 12th-15th days, extensive airless fields still remained in lung tissue which were filled with macrophages, polynuclears, lymphocytes and plasma cells. Foci of carnification developed. The interalveolar septa grew thicker and they gave off delicate reticular fibers in the direction of alveoli. The bronchial walls became thicker and their lumen was deformed. On the 20th day, there was progression of signs of pneumosclerosis and formation of adenomatous structures. There was obliteration of the lumen of many bronchi. Exudate-free pulmonary parenchyma underwent emphysematous change; SDH was depressed in parenchymatous elements of the organ, while LDH activity remained at a high level. The level

of blood serum lysozyme was reliably diminished, as compared to the control ($P<0.05$) at the first phase and at the height of illness. During resolution of pneumonia there was a tendency toward increase, but it was still low on the 20th day. The phagocyte number and index did not differ appreciably from the control series, but digestive capacity of stab nuclears was reliably diminished ($P<0.05$).

The form of pneumonia in animals that had been given carbophos was similar in morphogenesis to the pneumonia that developed against a background of PCP poisoning. However, alteration of the bronchovascular system of the lungs was not as intensive.

The bronchial lumen was narrowed and filled with mucous-suppurative exudate. Rheological properties of blood were impaired, with formation of stasis and thrombi, as well as increased porosity of microcirculatory system, as indicated by the profusion of glycosamine glycans, as well as appearance of fibrin and red cells in the exudate. Abscess foci developed on the 5th-7th day. After 9 days, proliferative changes advanced to the fore. The sites of destruction were surrounded by lymphocytes and histiocytes, while extensive lymphoid accumulations with nonorganoid structure developed around bronchi and vessels, and there was progression of carnification signs. On the 15th-20th day, part of the lung tissue was free of exudate, but there was progression of pneumosclerosis with development of adenomatous structures, polypous bronchitis and bronchiectasis. At this period, there was stable decline of SDH activity and increase in LDH activity in lung tissue, which was indicative of accumulation of acid products of glycolysis. Lysozyme activity was reliably diminished, as compared to the control series of experiments ($P<0.05$), and phagocytosis parameters were also depressed.

Thus, our findings indicate that toxic organochlorine and organophosphorus chemicals diminish nonspecific resistance of the body, impair redox processes, induce hypoxia, reduce the reserve of surfactant in large alveolocytes, causing change from an acute inflammatory process to a chronic one on the basis of changes such as abscessing, bronchiectases, carnification and deformation of the bronchi.

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CSO: 1840/1053

UDC: 616.89-07(049.3)

NEW BOOK ON PSYCHOLOGICAL DIAGNOSIS AND CORRECTION REVIEWED

Kiev VRACHEBNOYE DELO in Russian No 4, Apr 84 pp 121-122

[Review by G. L. Voronkov and V. M. Bleykher (Kiev) of book "Metody psikhologicheskoy diagnostiki i korrektsii v klinike" (Methods of Psychological Diagnosis and Correction in Clinical Practice) by M. Ye. Kabanov, A. Ye. Lichko and V. M. Smirnov, Leningrad, Meditsina, 1983, 312 pages]

[Text] This book is a manual of clinical psychology, which has been written in the traditions of V. M. Bekhterev and is based on enormous scientific research and clinical experience accumulated at the Leningrad Scientific Research Institute of Neuropsychiatry imeni V. M. Bekhterev.

The book is notable for breadth of its range. It deals with all aspects of the work of a clinical psychologist--diagnostic, therapeutic and rehabilitation; it sheds light on questions of theory and practice of psychology necessary to resolve the most difficult problems of modern medicine (M. M. Kabanov).

Considerable attention is given to making a distinction between the concepts of medical and clinical psychology, pathopsychology, which are being discussed in our times. There is a brief description of the basic stages of inception of these disciplines and outline of their development in the future. Questions of methodology of medical psychology are discussed in the aspect of a need to change from the organismic-centric approach to the evolutionary and ecological (population) one, which is inseparably linked with investigation of the psychosocial essence of man. Expressly the principle of psychosocial essence of man is the basis of the direction that the authors develop in clinical psychology, which is closely related to the holistic, systems approach that is being developed in recent years in different disciplines. There is complete validity to the authors' thesis that one of the most important means of applying the systems approach to modern problems of scientific and clinical medicine is the conception of patient rehabilitation.

The book sets for the basic principles and objectives of psychological diagnostication in clinical medicine (A. Ye. Lichko): distinction of specific personality types, detection of psychopathological symptoms, evaluation of efficacy of therapeutic and rehabilitation measures. Concrete examples are given to demonstrate the significance of validity--diagnostic relevance--of psychological tests. The basic theses have been developed concerning use of objective psychological history and psychological follow-up history.

The principles and methods are described for psychological examination of the internal signs of disease (V. M. Smirnov and T. N. Reznikova). The authors propose an information model of VKB [internal signs of disease], the structure of which makes it possible to determine the routes of its formation, significance to construction of an effective therapeutic process and prognostic evaluation of its different variants. It was shown that VKB depends not only on predisposition-personality factors, but different sorts of environmental factors, particularly microsocial ones. It was demonstrated that the VKB have their own distinctions with different variants of mental pathology, and the importance of knowing them to psychotherapy was shown.

A section dealing with personality questionnaires (I. N. Gil'yasheva) discusses questions of theory and practice of designing such methods; the traditionally best known and most frequently used methods are described (questionnaires of Cattell, Eysenck and the MMPI) and questionnaires developed and introduced by the institute's staff that are intended for determining the level of neurotization and psychopathization, depressive states, and are aimed at studying the subjects' self-appraisal of their characterological and personality traits.

Special attention is devoted to the pathocharacterological diagnostic questionnaire for adolescents, which is used by clinical psychologists (A. Ye. Lichko) and was developed on the basis of the conception of accentuation of personality.

It can be said without exaggerating that the personality questionnaire of the Bekhterev Institute (LOBI), which was developed by this institute's staff and edited by A. A. Lichko is an utterly unique psychological method, which permits making a rather objective judgment about a patient's psyche. The authors who designed the LOBI proceeded from the conception of psychology of attitudes [or relations] of A. F. Lazurskiy and V. N. Myasishchev. From the data obtained with the LOBI, a physician is able to judge a patient's well-being, his affect, attitude toward his illness, treatment, physicians and personnel, relatives and family, etc. It is very good that familiarization with this chapter enables the reader to use the questionnaire in his practice.

There are special sections in the book dealing with projective methods of examining the personality (I. G. Bespal'ko and I. N. Gil'yasheva) and intelligence (I. N. Gil'yasheva). They also cover theoretical aspects of several known psychological tests (Rorschach inkblots, TAT, Rosenzweig's test, Wechsler's intelligence scale); they are evaluated critically, which makes it possible to single out what is the most valuable in them, and extensive clinical data obtained from use of these tests and accumulated at the institute are reported.

There is a separate section in the book dealing with neuropsychological methods of examination (L. I. Vasserman). The methods are described quite fully, and the results are evaluated not only qualitatively but quantitatively, which is a sign of the novelty of this approach to the problem. These testing methods are used to diagnose local and organic brain lesions, which is very important to the clinical practice of neurologists and psychiatrists.

Use of electroencephalography, examination of galvanic skin responses and other electrophysiological methods are discussed as they apply to solving problems of clinical psychology (V. M. Smirnov and T. N. Reznikova).

A significant part of this textbook deals with principles of using psychological diagnostic methods in psychotherapy and psychocorrection. Symptomatic methods and the pathological system of psychotherapy and psychocorrection are discussed in this aspect (R. A. Zachepitskiy), as are group methods (G. L. Isurina) and distinctions of intrafamily relations (T. M. Mishina).

The final section of the book is concerned with organizational aspects of clinical psychology, which are of enormous practical relevance (M. M. Kabanov, R. A. Zachepitskiy). Here they discuss the possibility of training medical psychologists and wise planning of their clinical and research work.

The book contains an exceptionally large amount of valuable material, which the authors analyze on a modern scientific level within the limits of the traditions that have been established and are being developed by psychiatrists of the Leningrad schoool. It is a significant contribution to the development of Soviet medicine, both theoretical and clinical, and no doubt it will be rated highly by physicians, not only psychiatrists and neurologists, but representatives of other medical specialties, since there is not a single modern physician, no matter what his narrow profession is, that can construct correctly and in an optimum way the set of his therapeutic and rehabilitation measures without taking into consideration the useful data that psychological diagnostic tests can provide.

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CSO: 1840/1053

UDC: 614.4(083)(049.3)

REVIEW OF NEW MANUAL OF EPIDEMIOLOGY

Kiev VRACHEBNOYE DELO in Russian No 4, Apr 84 pp 124-125

[Review by F. I. Bogomolov (Lutsk) of book "Spravochnik po epidemiologii" (Handbook of Epidemiology)", by A. V. Pavlov, A. M. Kas'yanenko and K. M. Sinyak, Kiev, Zdorov'ya, 1983]

[Text] In the last 65 years, the teaching on control of infectious diseases has undergone substantial changes in our country. Our conceptions of many diseases have expanded incredibly. Medical specialists have conducted many studies, which reflect rather fully information about sources of infection, bacteriology and epidemiology of infectious diseases.

The set of preventive and epidemic-control measures developed on this basis was instrumental in lowering human morbidity considerably. However, at the present time, epidemiologists are faced with new tasks and pressing problems, the appearance of which is attributable to the nature of man's endeavors at the present time.

At the same time, it must be noted that administrators and physicians of therapeutic-preventive and sanitary-epidemiology institutions are experiencing an acute shortage of guides dealing with pressing problems of epidemiology. For this reason, publication of the book by A. V. Pavlov, A. M. Kas'yanenko and K. M. Sinyak is very timely; the book is needed not only by epidemiologists, but bacteriologists. This book contains a list of regulations pertaining to the legal basis of activities of the sanitary and epidemiological service, methodological recommendations on control of intestinal and droplet blood infections and infections of the integument.

In the section of regulations on legal basis of activities of sanitary and epidemiological service, a list is given of the orders of the USSR Ministry of Health, names of tests made at bacteriological laboratories of SES [sanitary and epidemiological stations], excerpts from "Instructions on Sanitary and Epidemic-Control Conditions at Hospitals," "Instructions on Procedures for Implementing State Sanitary Surveillance of Sanitary Condition of Therapeutic and Preventive Institutions by Agencies and Institutions of the Sanitary Epidemiological Service, approved by order No 258 of the USSR Ministry of Health dated 23 June 1976," with the recommendation that records

and accountability about infectious diseases be kept in accordance with the international classifications of diseases, 8th and 9th revisions, as well as procedures for requesting allocations for epidemic-control measures.

The documents submitted by the authors are validated, they cover a wide range of issues, they permit immediate organization of measures to prevent the spread of infectious diseases, make it possible to analyze complex phenomena of interaction between biological factors and the environment from the standpoint of modern scientific knowledge.

The section, "Intestinal Infections," describes preventive and epidemic-control measures referable to typhoid fever, salmonellosis, dysentery, intestinal diseases caused by enteropathogenic intestinal bacilli, brucellosis, leptospirosis, ornithosis, rotaviral gastroenteritis, procedure for discharging patients from hsopitals and their dispensary observation; a thorough description is given of an epidemiological investigation and measures to be taken if a patient with dysentery is not hospitalized, procedure for discharge and allowing workers in food enterprises and individuals of equal status to work there, documentary validation of leptospirosis as an occupational disease and measures to disinfect endemic leptospirosis foci; lists are provided of additional documents that regulate control of intestinal infections.

In the section, "Droplet Infections," instructions are given on immunization of children against pertussis, diphtheria, tetanus and measles; there are excerpts from methodological instructions on symptomatology, diagnosis and prevention of scarlet fever and meningococcal infection, excerpts from orders of the USSR Ministry of Health, "Steps for Further Lowering of Incidence of Measles in the USSR," temporary methodological instructions on how to organize and implement combined protection of the public against influenza, methodological instructions on control of tuberculosis for SES and list of additional documents that regulate work on control of tuberculosis.

In the section, "Blood Infections," there are instructions and methodological information on symptomatology, diagnosis, treatment and prevention of typhus, Q fever, methodological recommendations on diagnostication and prevention of tropical viral hemorrhagic fevers, exceprts from methodological instructions on symptomatology, treatment, laboratory diagnostic tests, epidemiology and prevention of tickborne encephalitis, methodological instructions on planning preventive inoculations against tularemia and methodological recommendations on organization and control of pediculosis.

The manual ends with a list of infectious diseases, for which final disinfection is mandatory, and a list of documents regulating disinfection work.

We must mention the convenient presentation for practical use of all of the documents in the different sections.

The reference material provided makes it possible to use it effectively to refine measures for the control of acute infectious diseases.

While we give a good rating to the book by A. V. Pavlov, A. M. Kas'yanenko and K. M. Sinyak, we believe that it would be desirable, when its next edition is

published, to include material regulating the work of medical-preventive and sanitary-epidemiology institutions dealing with prevention of poliomyelitis and control of fungus diseases.

On the whole, the handbook of epidemiology by A. V. Pavlov, A. M. Kas'yanenko and K. M. Sinyak is a valuable guide for epidemiologists, microbiologists, infectious disease specialists and sanitary-physicians.

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10,657
CSO: 1840/1053

PILOT STUDIES IN MICROBIOLOGY

Moscow DOMESTIC SERVICE in Russian 12 Jun 84

[Radio news-report]

[Text] Levon Agayan reports from the Institute of Microbiology of the Latvian Academy of Sciences, where a great deal of work has been done on inventing technology for obtaining the fodder concentrate lysine, which increases productivity in farm animals by up to 25 percent: three factories are already operating--using such technology--and several others are being built both in the USSR and in socialist countries. Lysine is also useful for stimulating plant growth and fighting seed pests.

The institute is, at present, working on bioengineering and biotechnology. Agayan summarises some of the institute's achievements, which include, in the field of virology, a study of poliomyelitis which has enabled that desease to be almost eliminated in the USSR.

Academician R. A. Kukain, head of the institute, and a research worker show Agayan around the institute, in particular the experiments being carried out on anaerobic processing of organic waste to produce organic fertilizer, biogas and process water. Research is also in progress in genetic engineering, in particular, work on interferon. In cooperation with the Latvian Institute of Organic Synthesis and allied institutes in Moscow, a clone of colibacteria has been produced and further work is being done to synthesise interferon for immunizing humans and animals. Preliminary experiments produced an interferonogen, a preparation which induces formation of interferon in the human body; a trial batch of such a preparation has already been manufactured at the institute's biochemical preparations plant. The importance of interferon and reasons for the high cost of conventional production are explained.

CSO: 1840/657

UDC 547.963.3:576.858.9

INCORPORATION OF PLASMID DNA AND STABILITY OF LIPOSOMES PREPARED FROM E. COLI TOTAL LIPID FRACTION

Moscow BIOKHIMIYA in Russian Vol 49, No 1, Jan 84 (manuscript received 9 Mar 83) pp 38-44

CHERNYAVSKIY, V.A., OBUKHOVA, Ye.L. and ZEROV, Yu.P., All-Union Scientific Research Institute of Highly Purified Biopreparations, Leningrad

[Abstract] Large, monolamellar liposomes were prepared from the total E. coli lipid fraction by successive ultrasonication, treatment with $CaCl_2$, and removal of Ca^{++} by EDTA. The procedure yielded liposomes ranging in size from ca. 200 to 500 nm which incorporated radiolabeled serum albumin and plasmid ColE1 DNA with respective efficiencies of 6.3 and 4.7%. Incubation of the DNA-containing liposomes at 4°C to test liposomal stability indicated that ca. 30% of the liposomes decompose during the first 2 h of incubation, while the remaining liposomes decompose with a half-life of ca. 10 h. Studies with plasmid pBR 322 DNA demonstrated that the circular DNA did not undergo any changes while incorporated and, on extraction from the liposomes, retained ability to transform E. coli HB 101 cells. It appears that liposomes prepared in the manner specified offer advantages in carrying out genetic transformation experiments vis-a-vis liposomes prepared from lecithin or other polar lipids, in that their composition (63.6% phosphatidylethanolamine, 10.5% phosphatidylglycerin, 24.6% diphosphatidylglycerin) coincides with the lipid composition of bacterial cytoplasmic membranes. Figures 7; references 15: 1 Russian, 14 Western.
[1501-12172]

UDC 577.323

SITE-SPECIFIC CLEAVAGE OF tRNA AND rRNA AT 7-METHYLGUANINE IN PRESENCE OF METHYLATED CARRIER RNA

Moscow BIOKHIMIYA in Russian Vol 49, No 1, Jan 84 (manuscript received 24 May 83) pp 160-162

ZUYEVA, V.S. and MAN'KIN, A.S., Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy, Moscow State University imeni M.V. Lomonosov

[Abstract] The method of Wintermeyer and Zachau [Wintermeyer, W. and Zachau, H.G., FEBS Letters, 58:306, 1975] for the cleavage of RNA molecules with 7-methylguanine was modified by the inclusion of methylated carrier RNA. Inclusion of the carrier markedly increased the efficiency of the cleavage process and allowed the use of lower concentration of the target RNA molecule. Trials with yeast $tRNA^{Phe}$ demonstrated that reduction of 7-methylguanine at position 46 by sodium borohydride and cleavage with aniline resulted in site-specific cleavage. The approach was also successful in the cleavage of E. coli 16S rRNA, with a 7-methylguanine at position 526. Figures 2; references 3 (Western).
[1501-12172]

UDC 615.2/.3.015.2:546.262

INTERACTION OF DRUGS AND ETHYL ALCOHOL

Moscow TERAPEVTICHESKIY ARKHIV in Russian No 5, May 84 pp 130-134

[Article by N. P. Skakun and A. N. Oleynik, Department of Pharmacology (Professor N. P. Skakun, chief) at the Ternopol Medical Institute]

[Text] The interaction of ethyl alcohol (ethanol) and drugs is manifested in the form of various pharmacological and toxicological effects. This interaction is influenced by the chemical, physico-chemical, and pharmacological properties of ethanol and the drugs, the condition of the body, especially the liver, the degree of ethanol intoxication, its metabolic effects, the length of alcohol abuse, etc. It is possible for there to be reciprocal effects on the pharmacokinetics, pharmacodynamics, and toxicity of the combined substances. At the receptor level, this is manifested as antagonism, potentiation, or an additive effect. Under the influence of ethanol, a tolerance can develop for many drugs as a result of induction of microsomal enzymes in the liver or adaptation of the corresponding receptors [36]. The body can develop hypersensitivity to certain drugs, as well as a tetany-like reaction. The hypersensitizing effect is usually the result of a disruption of the weakly balanced condition of the body due to prolonged alcohol abuse.

Alcoholic patients become dependent on drugs more easily, especially narcotic analgesics, meprobamate, benzodiazepine drugs, etc. [44]. Also, individuals who are dependent on ethanol are much quicker to develop a dependence on other narcotics, such as marijuana, mescaline, LSD, and heroine. Combining the use of such substances with alcohol consumption often leads to a potentiation of their negative effects [32].

When narcotics and soporifics are combined with ethanol their effect on the central nervous system increases because they affect the same receptors. Under the influence of ethanol serious difficulties arise in overcoming the stimulation stages of narcosis, caused by inhaled narcotic drugs [59].

Ethanol promotes the absorption of barbiturates in the digestive tract, if the concentration in the stomach does not exceed 5-10 percent; or the opposite happens, this process is retarded when the concentration exceeds 10 percent, since there is inflammation of the mucosa. Alcohol also disrupts the transport, distribution, and metabolism of barbiturates in the liver [6]. Therefore, there is possible potentiation of their effect on the central

nervous system. The degree of potentiation is also determined by the properties of the barbiturates. Ethanol produces a sharp increase in the length of sleep induced by sodium pentobarbital, only a moderate increase in that caused by hexanal or phenobarbital, and does not have any effect on barbital, pentothal, and predione [49]. Ethanol also causes a sharp increase in the sedative effect and toxicity of barbiturates [57]. Even with mild alcohol intoxication, the use of hexobarbital or sodium pentobarbital taken in generally accepted doses can have a fatal outcome because of acute depression of vital centers in the medulla oblongata [40]. It is thought that because of the distinctive membrane action of ethanol, the cell membranes in the brain are more permeable to barbiturates, which makes it easier for them to accumulate in the area of the receptors in the cerebrum, with which they interact. Evidently the increased toxicity of barbiturates induced by ethanol is also a result of competitive metabolism in the liver [14].

With acute alcohol intoxication there is also an increase in the toxicity of noxirone, paraldehyde, and other drugs [21]. Therefore, barbiturates, like other soporifics, should not be used in the treatment of patients with acute alcohol intoxication, or with the alcohol withdrawal syndrome.

A marked tolerance to barbiturates, nitrous oxide, narcotic ether, tribromoethanol, cyclopropane, methoxifluorane, chloralhydrate, paraldehyde, noxirone, bromizoval, carbomal, etc., has been observed in patients with alcoholism [8, 50, 51]. In addition to this, there is an increase in the body's resistance to the toxic effects of methanol, isopropyl alcohol, and other alcohols [39]. In these patients the toxicity of ethanol increases when it is combined with chloralhydrate [18]. This occurs because in alcoholics the metabolism of chloralhydrate in the liver is intensified due to the induction of microsomal enzymes. There is an accumulation of its closest metabolite, trichlorethane, which has the ability to inhibit aldehyde dehydrogenase, the most important enzyme in the oxidation of ethanol. In connection with this, there is a sharp suppression of the metabolism of ethanol and the level of acetaldehyde in the blood increases by a factor of 2-3 [16]. Therefore, chloralhydrate cannot be given to alcoholic patients. One also must not combine paraldehyde with ethanol, when the concentration of ethanol in the blood exceeds 150 mg percent. This can have a fatal outcome [29].

Ethanol interferes with the action of tricyclic antidepressants (imizine, amitriptyline, azaphene, fluoracizine, etc.) and it increases their toxicity. Tests used to determine subjects' ability to drive a car showed that the most extreme disruption in terms of the central nervous system occurs during the first two days of treatment with tricyclic antidepressants, even when small quantities of alcohol are consumed. Amitriptyline potentiates the disruption of motor responses caused by alcohol [33], [45]. Ethanol aggravates negative reactions that are characteristic of tricyclic antidepressants, such as impaired vision, constipation, intestinal sluggishness, and paralytic intestinal blocks [32]. In animals ethanol potentiates the hepatotoxic effect of amitriptyline. Therefore, when patients are being treated with tricyclic antidepressants, the use of alcohol is forbidden.

Also contraindicated is the use of ethanol when patients are being treated with antidepressants that are monoamine oxidase (MAO) inhibitors, specifically

iprazide and nialamide, because of the danger of hypertonic crises and intensification of ethanol toxicity [9, 15]. With this combination there is a sharp increase in the content of catecholamines and serotonin in the body's tissues and fluids [47]. The metabolism of ethanol is also retarded. The prohibition against alcohol lasts not only for the entire period during which MAO inhibitors are being used in treatment, but also for the following two weeks. This is due to the prolonged inhibitory effect of these drugs on MAO. The development of hypertonic crises in patients being treated with MAO inhibitors can be caused not only by strong alcohol beverages, but also wine and beer, since in addition to ethyl alcohol they contain tyramine products, from which the body forms catecholamines.

The combination of ethanol and neuroleptic drugs also has an effect on their pharmacokinetics and action. For example, aminazine retards the metabolism of ethanol, which intensifies and prolongs its effect. Prolonged use of alcohol disrupts the metabolism of aminazine and other drugs in the phenothiazine series (propazine, metherazine, ethaperazine, triphtazine, etc.) in connection with the induction of microsomal enzymes and liver damage [12]. Simultaneous use of these drugs and ethanol leads to a sharp decline in psychomotor coordination, which is very dangerous in the operation of mechanical devices and vehicles. Ethanol also potentiates hypotension and impaired breathing caused by derivatives of phenothiazine. For this reason aminazine and other drugs in this group should not be used to treat acute alcohol intoxication, or to treat the withdrawal syndrome in alcoholic patients. In this situation there is an increase in the activity of the ascending reticular formation and therefore there is an increased risk of convulsions [27].

Other neuroleptic drugs, specifically chlorprotixin, reserpine, and haloperidol, also potentiate the disruption of motor activity induced by ethanol, even more than phenothiazines; these drugs also potentiate other effects of ethanol, especially with prolonged use [13]. The use of these drugs to treat patients with alcoholism is forbidden.

Lithium carbonate suppresses the euphoria caused by ethanol [26] and inhibits its negative effect on motor skills [37].

Sedative drugs that are derivatives of benzodiazepine (chlordiasepoxide, diazepam, oxazepam, etc.) differ from neuroleptic drugs in that they do not potentiate the effects of ethanol. Therefore, combined use of these drugs and alcohol does not have any hidden dangers [55]. The tolerance to them, and physical and psychological dependence on them develops only with prolonged use in large doses [60]. Chlordiazepoxide not only does not intensify the effect of ethanol on the central nervous system, it weakens it. Therefore it is used to treat patients with acute alcohol intoxication and patients suffering from alcohol withdrawal syndrome. It is also effective in the treatment of patients suffering from alcoholism. In this respect, diazepam is not very active since ethanol retards its absorption in the digestive tract and intensifies its metabolism in the liver.

Diazepam, like chlordiazepoxide, must not be combined with ethanol in people who are driving vehicles. The effects of this combination, such as drowsiness, fatigue, nystagmus, and limited psychomotor activity, can lead to highway

accidents [34]. With chronic use of alcohol in large quantities, the bioaccessibility of diazepam is reduced and its action is weakened [53].

Carbamic ethers of substitute propanediol (meprothane, isoprothane) not only do not weaken the effect of ethanol, they even potentiate the depression caused by ethanol. Ethanol intensifies the sedative effect of meprothane. The combined action of ethanol and meprothane is a weakening of the thought processes, a decline in psychomotor coordination, and drowsiness. These effects are particularly pronounced when alcohol is consumed after prolonged meprothane treatment. In such cases there can be loss of consciousness, acute depression of the respiratory center, and even death. It is absolutely unacceptable for people who operate mechanical devices or vehicles to combine the use of alcohol and meprothane [1]. In the case of alcoholism, the effect of meprothane is diminished because of its accelerated metabolism in the liver [41]. It is not recommended that meprothane be used to treat patients suffering from alcoholism. In the first place, it is not an ethanol antagonist; in the second place, it is a mild tranquilizer; in the third place, tolerance to meprothane develops quickly, as does physical and psychological dependence on the drug.

Central nervous system stimulants, especially phenamine, meridil, caffeine, corazole, etc., are antagonists of ethanol in terms of its depressive effect on the brain and spinal cord. Phenamine, for example, weakens the depressive effects of sublethal doses of ethanol, eliminates ethanol-induced nystagmus, speeds up recovery even with very severe ethanol intoxication, but does only a little to improve the psychomotor activity that is weakened in this state of intoxication [2, 50, 51]. The effect of caffeine on psychomotor activity during intoxication, like many other central nervous system stimulants, either is not evident at all or is expressed only very mildly [17]. Psychostimulants (caffeine, phenamine, meridil, sydnocarb, etc.) intensify the stimulation observed during acute alcohol intoxication. Phenamine and meridil intensify the alcohol-induced impairment in one's ability to drive a car. In patients with alcoholic liver damage, the effect of central nervous system stimulants can increase sharply with their delayed excretion from the body [54].

As antagonists of the depressive effects of ethanol, central nervous system stimulants are used in acute alcohol intoxication in order to restore the excitability of vitally important centers. Their effectiveness is determined by the degree of the drug's analeptic activity, its dose, as well as the severity of alcohol intoxication. They are ineffective in the case of alcoholic coma.

The use of alcohol by individuals suffering from epilepsy can bring on an attack of convulsions, which usually occurs when the concentration of ethanol in the blood begins to fall [46]. In this case anti-convulsive drugs do not prevent the epileptic attack. With acute alcohol intoxication the metabolism of these drugs is evidently undisturbed. In patients suffering from alcoholism, because of the induction of microsomal enzymes in the liver, biotransformation of anti-convulsive drugs is accelerated and therefore they have a less pronounced effect [28]. There is a need for increased dosages, which presents a risk of toxic effects. Consequently, the use of alcohol by individuals suffering from epilepsy is contraindicated because of the possible

provocation of convulsive seizures, and also because of the reduced effectiveness of treatment with anti-convulsive drugs.

Ethanol increases the toxicity of analgesic drugs (morphine, omnopon, acetylsalicylic acid, paracetamol, etc.). Death can result if morphine is used in average therapeutic dosages by individuals in a state of acute alcohol intoxication [42]. Prolonged consumption of alcohol leads to an increase in the body's sensitivity to morphine, and prolonged treatment with morphine and its analogues sensitizes the body to ethanol. There are descriptions of the fate of heroine addicts who had been undergoing phenadone treatment for a prolonged period and developed a dependency on alcohol. The mortality rate in this group was 10 times higher than among phenadone patients who did not abuse alcohol [30]. Cases have been encountered of combined morphine and alcohol addiction, as well as shifts from one type of addiction to another, with the development of multiple addictions and cross tolerance [5, 7].

The combined use of ethanol and acetylsalicylic acid causes a sharp increase in the danger of manifestation of aspirin's ulcerogenic effect and gastrointestinal bleeding. Acetylsalicylic acid, like aminopyrine, damages the gastric mucosa, retards the absorption of ethanol, induces pyloric spasms, and promotes an inflammatory response [24]. In patients suffering from alcoholism who also have gastritis and cirrhosis of the liver, acetylsalicylic acid even in average doses can cause massive gastric bleeding.

The combined use of pyrazolone derivatives (antipyrine, aminopyrine, analgine) and ethanol leads to a severe drug reaction with nausea, sluggishness, ringing in the ears, tachycardia, and collapse. Ethanol prolongs the effect of aminopyrine and intensifies the toxicity of paracetamol. In individuals who constantly consume alcohol, paracetamol even in relatively small doses can cause severe hepatocellular necrosis [35], since as a result of the induction of microsomal enzymes in the liver there is more energetic metabolism of paracetamol and more significant accumulation of its hepatotoxic metabolites, specifically N-oxyparacetamol, and others [20].

Ethanol influences the kinetics and action of many drugs used to treat the heart and blood vessels. The interaction between ethanol and digitalis drugs in the presence of alcoholic cardiomyopathy can be expressed in the form of increased excitability of the heart, especially during alcohol withdrawal, when the level of magnesium in the blood is usually lowered.

Ethyl alcohol potentiates the hypotensive action of octadine, nitroglycerine, and clopheline [4]. It promotes the occurrence of orthostatic collapse in connection with octadine treatment and intensifies the central effects of clopheline: its hypotensive, sedative, soporific, and hypothermal action. Ethanol also potentiates negative reactions that sometimes occur after the use of nitrosorbide and erinite, such as nausea, vomiting, dizziness, sweatiness, and collapse. Therefore these drugs should not be taken with ethanol or in conjunction with alcohol intoxication.

Ethanol does not potentiate the hypotensive effect of anaprilin. This drug inhibits the depressive effects of ethanol and retards the alcohol-induced stimulation of the adrenal system [43]. Therefore it is used as an effective

drug in the case of acute alcohol intoxication and in the alcohol withdrawal syndrome. Even in small doses anaprilin suppresses the alcohol-induced euphoric reaction in alcoholic patients [30].

Ethanol in turn retards absorption of anaprilin and accelerates its excretion from the body. It intensifies the hypertensive effects of adrenaline, noradrenaline, ephedrine, vasopression, and other drugs. In the presence of reserpine, the potentiating effect of ethanol on the hypertensive action of adrenaline and noradrenaline is less pronounced, and it has no potentiating effect at all on the action of ephedrine and vasopressin [38].

The incompatibility of ethanol and anticoagulants has been recognized for a long time. The use of alcohol in combination with these drugs can lead to an intensification of their effect on blood coagulation, and to hemorrhaging [58], especially in patients with liver disease [48]. On the contrary, in patients with chronic alcoholism the use of indirect anticoagulants (dicoumarin, neodicoumarin, warfarin) can be ineffective as a result of stepped-up metabolism, especially during a period of abstention from alcohol [28].

Ethanol potentiates the diuretic and hypotensive effects of diuretic drugs, which also leads to side effects such as nausea, vomiting, diarrhea, weakness, and even orthostatic collapse. This applies primarily to benzothiadiazine derivatives (dichlothiazide, cyclomethiazide, etc.) In the presence of alcohol intoxication the use of ethacrynic acid can lead to temporary hyperglycemia. Ethacrynic acid in turn prolongs the action of ethanol because of a suppression of alcohol denydrogenase [52].

Ethanol interferes with the metabolism and action of vitamins, especially in patients with alcoholism. One often sees vitamin deficiencies in such patients, especially deficiencies of the B vitamins. The development of alcoholic polyneuritis is tied to disruption of the active transport of thiamine. Even a single use of ethanol leads to a retardation of this process [25].

In patients with alcoholism the disruption of pyridoxine metabolism usually is manifested as anemia, and interference in the absorption of folic acid in the digestive tract leads to megaloblastic anemia [23]. Interference in the metabolism of cyanocobalamin has the same result [10]. In patients with alcoholic cirrhosis of the liver and signs of liver insufficiency, the body has a heightened sensitivity to 25-oxycholecalcipherol. Introduction of this substance can cause a significant rise in the blood's calcium level [56].

Several vitamin preparations (thiamine, riboflavin, pyridoxine, nicotinic acid, and ascorbic acid) combined with glucose are used in the treatment of acute alcohol intoxication. It is thought that combinations of this type increase the body's resistance to ethanol.

Ethanol has varied effects on the metabolism of hormones and on the pharmacokinetics and pharmacodynamics of hormone preparations. Several hormone preparations in turn affect the kinetics and action of ethanol.

Thyroid hormones retard the activity of alcohol dehydrogenase, and therefore prolong the action of ethanol. Sex hormones retard the absorption of ethanol in the digestive tract and speed up its metabolism somewhat. As a result, there is a decrease in the narcotic action and toxicity of ethanol [22]. By inducing microsomal enzymes, ethanol speeds up the metabolism of hormones that are broken down by these enzymes. For this reason, in alcoholic patients there is more rapid inactivation of the majority of steroid hormones and consequently there is a weakening of their effect on the metabolism of substances and on various processes. Oral contraceptives that contain estrogens retard the metabolism of ethanol [37].

Ethanol intensifies the hypoglycemic effect of insulin, on the one hand because it retards autoregulatory mechanisms that maintain a certain blood sugar level; and on the other hand, because it suppresses glyconeogenesis from products such as amino acids, glycerine, lactic acid, and so on. By reducing the content of catecholamines in the blood, ethanol retards the restoration of the blood sugar level that was lowered by insulin [11]. Cases are known in which patients with diabetes mellitus suffered irreversible neurological disruptions as a result of using alcohol in combination with insulin treatment. Therefore, a categorical ban against the consumption of alcohol is an important condition in the treatment of diabetes mellitus.

When the use of ethanol is combined with oral antidiabetic drugs there is an increase in their toxicity. In particular, the use of sulfanyl urea derivatives (chlorpropamide, butamide, etc.) can cause hypoglycemia and a tetany-like reaction; the use of biguanidine series drugs, (glybutine, etc.) can cause lactate acidosis and an unpleasant metallic taste in the mouth.

As a result of increased activity of liver microsomal enzymes in alcoholic patients the metabolism of oral insulin substitutes, especially butamide, may be intensified and therefore their activity may decrease [52]. In these cases the patients may have to resort to larger doses or more frequent use of the drug.

When ethanol is combined with some drugs used in chemotherapy, there are interactions that often lead to a reduction in the effectiveness of the chemotherapy, and even to an intolerance to the drugs. For example, an intolerance occurs when ethanol is combined with nitrofuran drugs, metronidazole, and other drugs and involves a tetany-like reaction. There is a sharp increase in the action of ethanol under the influence of cycloserine and griseofulvin. In alcoholic patients the metabolism of antibiotics in the rifampicin group is intensified [19]. With prolonged use of large quantitites of alcohol the bioaccessibility of penicillin is reduced [53], but there is an increase in the bioaccessibility of aminoglycoside antibiotics, such as streptomycin, neomycin, monomycin, kanamycin, etc., in connection with alcohol-induced injury to the digestive tract mucosa [31].

During treatment with anthelminthic drugs, both for several days before and after their use, the consumption of alcohol is strictly contraindicated, since alcohol promotes resorption of these drugs and manifestation of their negative resorption action [3].

Thus, the interaction of drugs and ethyl alcohol is a complicated process. A change in the pharmacokinetics and pharmacodynamics of combined substances often affects to a significant extent the effectiveness and safety of the pharmacotherapy. In their practical work medical personnel should take into account the negative consequences of the interaction of ethanol and drugs.

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9967
CSO: 1840/1062

GDR PHARMACEUTICAL EXHIBIT

Riga SOVEBKAYA LATVIYA in Russian 6 Jun 84 p 4

[Text] An exhibit of GDR [East German] pharmaceutical industry products was held in Riga over a period of several weeks. The exhibit was organized by the GERMED People's Combine and the Germed-Export-Import Foreign Trade Company of the German Democratic Republic. Commenting on this event is the manager of the Riga Pharmacy No. 2, Candidate of Pharmaceutical Sciences Aleksandr Iosifovich Palin: "Medical products produced in the GDR have excellent reputations in many countries, including the USSR. They are distinguished by excellent quality and effectiveness. The current exhibit has introduced us to only a fraction of the wide variety of preparations used in therapeutic practice in the GDR. Broad studies in the field of pharmacology and pharmacy are being conducted in that fraternal country. That country's scientists are carrying out those studies on the basis of a strongly-developed pharmaceutical chemical industry that is producing highly diversified medicinal products. Many of the exhibited products are being successfully used in our republic. I shall name a few of them. For example, Korinfar, Kordan, Obzidan, Kurantil, and Valocordin are from the cardiovascular group of medicinals. Tranquilizers include Rudotel and Meprobamate. Antispasmodics include Finlepsin, Antelepsin. Among the hypnotics is the preparation Radedorm. Medicinals for treating diabetes include Insulin B, Oranil, Orabet, Maninil. Highly effective glycocorticoids include Kenacort and Kenalog.

I have had occasion to be in the GDR several times, and was able to see for myself the attention being given to the manufacture of sera and vaccines as well as medicinals used in veterinary medicine. The action of any one particular preparation is largely determined by the form given to the active ingredients. German scientists accord that factor primary importance and find the optimum form for each medicine. Take, for example, the antispasmodic Pantenol with which we are very familiar. It is also used for other purposes. In addition to the aerosol form, it is produced as an ointment used in dermatology, an ophthalmological ointment, in ampules for injections, and in tablets. One should also note the wide variety of medicinals for special uses, including pediatric preparations. Such preparations for the little patients must possess pleasant taste properties. Our friends are also producing medicinal herb preparations most of which can be obtained without a physician's prescription. Within the CEMA framework, constant contacts are maintained between Soviet and German scientists in all fields of science, including pharmacology.

During the exhibit, associates from institutes and clinics in Berlin, Leipzig, Dresden, and other cities held interesting discussions about contemporary aspects of the pharmacalogical treatment of cardiac diseases, the use of anti-epileptics, and other important problems. Those discussions doubtless were of enormous benefit to Latvian specialists."

6289
CSO: 1840/651

CARELESS PROVISION OF EVERYDAY SERVICES

Tashkent PRAVDA VOSTOKA in Russian 16 May 84 p 3

[Article by V. Matusevich, PRAVDA VOSTOKA correspondent: "Everyday Concerns"]

[Text] The scene is the reception room of the therapeutic department at Clinical Hospital No 2 of the republic's Ministry of Health. The situation is unusual. Doctor N. Borshchov announces with irritation that it is not his responsibility to receive patients who have been brought in by ambulance. He does not even invite F. Kramarenko, who is complaining of chest pains, to sit down. F. Kramarenko was also treated callously by N. Berdyyev, district therapeutic physician at Polyclinic No 24 in Chilanzarskiy rayon. The physician visited the patient twice at home, and did not hospitalize him, even though his condition was critical. Four days after F. Kramarenko went to the clinical hospital, he died.

The wife of the deceased went to the public prosecutor's office for justice. At her request criminal proceedings were instituted. A panel of legal and medical experts determined that "An acute myocardial infarction went undiagnosed at every point at which the patient sought medical help." A trial was held. The defendants were sentenced. Furthermore, Borshchov was denied the right to hold any job that involved treating people for five years, and Berdyyev was denied this right for three years.

Fulat Abdurakhmanovich Khakimov, public prosecutor for Chilanzarskiy rayon, said, "Statements and complaints from citizens' not only help to restore the rights that were violated in a specific case, they also provide evidence of shortcomings at the enterprise or organization involved."

Department No 2 of "Tashteploset'" [Tashkent Heating Network] does a cursory job of responding to complaints, without taking any measures. Written documents often are not registered and go unanswered. For example, Kh. Karimov, deputy of the rayon Council of People's Deputies, sent in a request about heating buildings 6 and 16 in block 16. The letter was simply shelved for a long time. This has happened in other cases as well. The department has no monitoring of the review and handling of complaints. Without this it is impossible to eliminate the problems that elicit complaints.

Serious shortcomings have also been found in the rayon housing production and operating trust, in the State Insurance Inspectorate, and in the apartment section of the rayon soviet executive committee.

A session of the Chilanzarskiy rayon Council of People's Deputies which was held in April considered the question of how enterprises and organizations should carry out the directive of the Presidium of the USSR Supreme Soviet "On a System for Reviewing Citizens' Suggestions, Appeals, and Complaints." The results of inspections made by the public prosecutor's office were also discussed. R. Grinberg, chief of department No 2 of "Tashteploset'"; I. Gulyamov, chief of the State Insurance Inspectorate; and several other administrators had to appear before the deputies and answer for their work.

In the first quarter of this year the number of appeals coming in to the public prosecutor's office was much lower than in the first three months of last year. This is gratifying, and it is an objective indicator of the improved work being done in the rayon to protect people's rights. Still, there are hundreds of appeals made by citizens to the public prosecutor's office over the course of a year. This means that there is still more work to be done.

Matters that at first glance seem to be minor, everyday problems, but are very important to the person filing the complaint, account for a large volume of the appeals. It is important to hear the person out patiently, and to explain to him the legal provisions. N. Ivlev, deputy prosecutor; M. Pulatova, senior assistant prosecutor; K. Iskhakova, assistant; and other staff members receive citizens everyday. Their main goal is to resolve each complaint fairly.

A. Purisov, a veteran of labor, appealed to the public prosecutor's office to speed up the authorization of his pension, which had dragged on for a long time. After 10 days he sent a letter that said, "I am very grateful to the staff of the public prosecutor's office for helping receive my pension payments."

Critical comments from workers and their suggestions for improving the working style of the system, which are aimed at party, soviet, and rights protection agencies, are of immense benefit. But, there are some malevolent individuals who are just trying to blacken someone's good name. Hundreds of people are taken away from serious business to investigate all sorts of slanderous statements. One such slanderer was S. Yepifanov, a former employee of the Central Design, Planning, and Technology Bureau of the republic's Ministry of the Meat and Dairy Industry. On behalf of the "collective" (without giving his last name), he asserted that a number of workers at the Bureau were taking bribes and embezzling funds. When the regular representative commission arrived, he was fairly rubbing his hands together, hoping to remain in the shadows. The commission, however, discovered what was really going on. It turned out that Yepifanov was the one who needed to be exposed.

Every citizen has the right to make suggestions and point out shortcomings to state agencies and social organizations that are aimed at improving their activity. These statements, however, are not always given the proper consideration. In other words, the right to criticize, which is guaranteed by

the Constitution, is being violated. It is the honorable and complex task of workers in the public prosecutor's office to restore justice.

9967
CSO: 1840/633

MEDICAL SCREENING IN KAZAKHSTAN

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 8 May 84 p 4

ALIYEV, M., minister of health, Kazakh SSR

[Abstract] A brief survey is presented of the current status of mass medical screening (dispensarization) in Kazakhstan, in light of the decisions of the June 1983 Plenum of the CPSU with regards to the general state of health in the USSR, and preventive medicine in particular. The health improvement program consists of two broad phases: the first phase is to encompass the period 1984-1987 and is to emphasize identification and treatment of people with cardiovascular, oncologic, endocrine, pulmonary and other problems which make a major contribution to general morbidity and lost work days. The second phase will encompass the period 1988-1990 and will concentrate on further improvements and expansion of preventive health services in the urban and rural areas. Full success of the program in Kazakhstan, as in the other republics, will depend on full cooperation between the medical, government, and party cadres in coordinating and implementing decisions crucial to this program. In certain areas of the republic, for example in Alma-Ata, Northern Kazakhstan, Karaganda and other oblasts the success to date has been outstanding. In others, however, such as Aktyubinsk, Kustanay, Tselinograd, Semipalatinsk and Chimkent oblasts, where the medical and other personnel seem to be less motivated in meeting socialist goals, much remains to be done to bring the program to a successful conclusion.
[631-12172]

UDC 613.6

COMPUTER-ASSISTED PREVENTION OF INDUSTRIAL TRAUMA

Moscow MASHINOSTROITEL' in Russian No 4, Apr 84 p 19

VOLCHKOV, S.V., candidate of technical sciences

[Abstract] An analysis of currently available computerized information on industrial accidents and occupational diseases has shown that the system has a number of shortcomings. The most serious are related to the fact that only superficial statistical data on morbidity are included, while working

conditions predisposing to disease or accident, safety regulations and their enforcement, sanitation, etc., are excluded. A definite improvement in this situation will require the design of a new series of all-encompassing descriptors that will yield high-quality information on demand. Such data can then be used in planning preventive measures and improving working conditions, and assist in an on-going analysis of all factors important in industrial safety. [634-12172]

DEPUTIES LOOK AT PUBLIC HEALTH

Kiev RADYANS'KA UKRAYINA in Ukrainian 31 May 84 p 2

KONTSEVYCH, N., zootechnicians, Zdobutok Zhovtnya Collective Farm, deputy, Oblast Soviet of Peoples' Deputies; POTAPOCHKINA, L., dairymaid, Pam'yat' Lenina Collective Farm, deputy, member of Permanent Commission on Public Health and Maternal Health of Zhytomyr Rayon Soviet of Peoples' Deputies; and FEDORUK, L., special correspondent, Radyans'ka Ukrayina, Zhitomir Oblast

[Abstract] Medical services have much improved in recent years in the Zhitomir Oblast, and the Zhitomir Central Rayon Hospital and Polyclinic is an excellent example of the combination of high-quality medicine, esthetics, and managerial efficiency. Public education has also been a factor in improving the quality of medical services in the oblast, since in addition to raising expectations it has also contributed to a better appreciation of the problems that medical personnel encounter. A particularly welcome development is the decision of some young physicians to reside in villages and remain close to the people. Unfortunately, many graduates of the Western Ukrainian medical institutes fail to show up even for short-term assignments in the Zhitomir Oblast, or leave before their assignment is up. It seems that for all practical intents and purposes they prefer to remain in Western Ukraine. [650-12172]

VETERINARY MEDICINE

GOALS IN VETERINARY SCIENCE OUTLINED

Moscow PRAVDA in Russian 7 May 84 p 3

[Article by N. Sadovskiy, professor at Orenburg Agricultural Institute, honored scientist of the RSFSR: "Serving Manking; Problems and Opinions"]

[Text] Workers in veterinary services have an important role in carrying out the country's Food Program. Hundreds of thousands of physicians, feldshers, and medical attendants are employed in animal husbandry. Soviet veterinarians take pride in the fact that plague, smallpox, pleuropneumonia, and a number of other diseases no longer occur. The tasks of contemporary veterinary science have grown more complex, and new problems have arisen both in practice and in training specialists in this sector.

The first knowledge about treating domestic animals has come to us from ancient times. In ancient Russia people were treating domestic animals as early as the 10th century. There are fascinating pages in the science and practice of treating livestock. In our country, veterinary services have developed and grown stronger during the Soviet era. One could describe at great length the successes that have been achieved in combatting infectious diseases among livestock. Without a doubt, great achievements have been made in this area. Without diminishing what has been accomplished, I would like to focus attention on a number of important issues facing veterinary science today.

The prevention of noncontagious diseases is of primary importance today. According to data from the Veterinary Science Administration of the USSR Ministry of Agriculture, death of animals due to diseases of this nature represents 90 percent of the total loss of livestock. This figure means millions and millions of head of livestock. If one adds in the premature slaughter of animals for this reason, the number rises even higher.

For confirmation of this, I will refer to examples in Orenburg Oblast, where meat and dairy livestock breeding is quite developed. Over the past 10 years here, about 700,000 cattle with noncontagious diseases have been found every year. The incidence of disease among sheep, goats, and pigs remains high. Of course, all this results in considerable losses. In 1983 several hundred thousand head of all types of livestock in the oblast died from noncontagious diseases or had to be slaughtered for that reason. This type of situation cannot be considered normal. There is also no reason to believe that the level

of veterinary services in Orenburg Oblast is lower than in other parts of the country.

In some places, people have reconciled themselves to these losses and consider them unavoidable. But is that really so? Shortages of meat, milk, and other products due to livestock diseases can and must be reduced to a minimum. The main causes of disease include: the low level at which tasks are performed at many farms; the poor quality and shortage of feed; the unsatisfactory conditions of accomodations, especially the floors; draftiness; and overcrowding of the animals. The manner in which many farms carry out medical and preventive care is a source of concern. Often veterinary specialists are assigned tasks that are not really part of their job, and sometimes they simply do not have enough time to perform the tasks for which they are directly responsible. In many republics, krays, and oblasts there are rural medical and preventive care centers, but far from all of them do everything that they are supposed to. They suffer from a shortage of physicians and inadequate supplies of medicines and equipment.

We can find an example of this again in Orenburg Oblast, where 54 of these centers were organized. Just one of them is really operating efficiently, however; it is at the "Burtinskiy" sovkhoz in Belyayevskiy rayon. The director of the center is P. Pilyugin, honored veterinarian of the RSFSR; he is also the chief veterinarian of the farm. The center that he manages has saved the sovkhoz almost 300,000 rubles over recent years. The loss of sheep and cattle at the "Burtinskiy" sovkhoz has dropped to half of the previous level; and 99.7 lambs are received for every 100 sheep, which is higher than the average indicator for the oblast. The same cannot be said about the efficient operation of many other medical and preventive care centers.

What is the problem here? The primary problem is a shortage of personnel. There is just one veterinarian for every three physician's positions at the oblast's sovkhozes. Yet the veterinary faculty at the Orenburg Agricultural Institute has been in operation for over 50 years and every year it sends up to 80 graduates into the oblast. Unfortunately, this profession has become one that lacks prestige. Quite a large proportion of the graduates do not choose to work in veterinary practice, preferring instead to work as livestock specialists and directors of departments or brigades, sometimes even in other oblasts.

The reason for this, in my opinion, is the following. A veterinarian has full responsibility for the livestock's safety. But his possibilities are extremely limited. For example, the supply of medicines, instruments, and other means for protecting livestock from diseases is poorly organized. Factories that produce biological preparations, in pursuit of high "gross output" indicators, put out preparations in large containers--up to 200 and more milliliters per bottle. The veterinary worker uses up just a small amount on the inoculations, and the rest must be destroyed since the one cannot store the opened bottle. Many farms do not have offices for veterinarians that are equipped with all the required articles.

Information on achievements in veterinary science and on advanced practices in animal health only trickles into farms. Just one scientific-production journal

in the field, VETERINARIYA, is published in this country. It is widely known, after all, that protecting animals from disease also benefits human health. We recall the ancient saying: "Medicine serves a man, and veterinary science serves mankind."

Many of the difficulties in this field stem from higher education: the quality of training veterinarians and feldshers is unsatisfactory at a number of VUZes and technical schools. When they obtain a weak theoretical base, students do a poor job of mastering practical skills. The majority of educational institutions with specialization in this area do not have any clinics, and where they do exist, there are not many sick animals. There are enough patients at kolkhozes and sovkhozes, but the educational clinics do not have the means of transport to get these animals, nor the fodder to keep them. As a result, students study animal diseases and learn how to treat them primarily out of textbooks. There is no practical clincial training for future veterinarians and feldshers directly at livestock farms and training farms, because buses are needed for this, and the VUZes have a shortage of buses. During their on-the-job training, the students are left to their own devices, as a rule. As a result, young veterinarians and feldshers are unsure of themselves and avoid therapeutic work.

The USSR Ministry of Higher and Secondary Specialized Education recently approved a new curriculum for veterinary institutes and faculties. One would think that the new curriculum would eliminate the deficiencies that we have described. Unfortunately, this is not the case. The hours designated for many of the specialized subjects have been cut back. Only during the study of clinical disciplines do the students learn methods for examining and treating sick animals. And these are precisely the disciplines for which instruction has been cut back in the new curriculum. In my opinion, the curriculum is in need of some serious improvements, as is the state examination system.

I believe that immediate steps need to be taken to improve the effectiveness of the country's veterinary services. Today the system is poorly coordinated. In addition to the state services, there are sovkhoz, kolkhoz, transport, sanitary (at markets), and other veterinary services in operation. They are under the control of various organs and they have different goals, which of course does little to promote unification of their efforts to prevent and effectively treat diseases. Many specialists are speaking out in favor of unifying veterinary services into a single system, following the example of the health care system. The effectiveness of veterinary services must be increased either in this way or by taking other measures.

I think that it would be worthwhile to consider removing veterinary personnel out from under the control of farm administrators, paying their wages within a veterinary system, and not within the accounting system of the kolkhoz or sovkhoz, with a unified wage scale. Specialists should receive equal wages for equal work. This is not the case at present. For example, a chief of a veterinary section in the state services receives one-half to two-fifths the wages that are paid to a veterinarian who is his subordinate at a kolkhoz or sovkhoz. It is time to eliminate this abnormality, and to establish strict control over the fulfillment of the demands of the USSR Veterinary Regulations.

The problem of building veterinary institutions in rural areas is still critical. I will again use Orenburg Oblast as an example. Of the 35 stations there for combatting animal diseases, only 17 are located in standard buildings. The majority of the veterinary sections are crammed into facilities that have been adapted for that purpose, while 38 of them actually have no accommodations anywhere--the medicines, biological preparations, and instruments are kept in the apartments of the veterinary workers, which is categorically forbidden.

The role of science cannot be overlooked. Many recommendations from scientific research institutions and scientists at VUZes have been put into practice. However, the level of veterinary services remains low. Science must bear some of the responsibility for this. One would like to see more from the Veterinary Science Department of the USSR Academy of Agricultural Sciences imeni V. I. Lenin. While scientists there are working on developing methods to prevent infectious diseases, little is being done in the campaign against noncontagious diseases. The country does have scientific research institutes for noncontagious livestock diseases. The staff members of these institutions often come out with recommendations in special publications. Of course, this is not bad, but there is one point of concern: over the past 10 years livestock losses due to noncontagious diseases have not declined by even one percent.

The time has come to make a decisive increase in the effectiveness of veterinary services, to strengthen the material base for veterinary science in rural areas, to improve the quality of training for specialists provided at VUZes and technical schools, to add provisions for measures against noncontagious livestock diseases to the Veterinary Regulations, and to make stricter demands for the fulfillment of these regulations. Of course, these measures entail certain expenses. There is no doubt, though, that there will be rapid recovery of the investment.

9967
CSO: 1840/632

UDC: 581.6:634.0.28:061.3(47+57)

ALL-UNION CONFERENCE ON 'PROBLEMS OF UTILIZATION OF NONARBOREAL AND SECONDARY FOREST RESOURCES FOR FOOD AND FEED' (24-26 MAY 1983, KRASNOYARSK)

Leningrad RASTITEL'NYYE RESURSY in Russian Vol 22, No 2, 1984 (manuscript received 21 Nov 83) pp 287-289

[Article by P. D. Sokolov, Botanical Institute imeni V. L. Komarov, USSR Academy of Sciences, Leningrad]

[Text] The All-Union Conference on "Problems of Utilization of Nonarboreal and Secondary Forest Resources for Food and Feed" convened in Krasnoyarsk on 24-26 May 1983. It was organized by the Scientific Council for Forest Problems (section of nonarboreal forest resources, chairman: Prof L. K. Pozdnyakov, doctor of agricultural sciences), USSR Academy of Sciences, and it was held by its head institution, the Institute of Forestry and Timber imeni V. N. Sukachev, USSR Academy of Sciences (ILiD, Siberian Department of USSR Academy of Sciences).

Much organizational work was done in preparing for this conference. By the time it convened, the IliD had published summaries of papers.* About 150 people participated in the work of the conference, and they represented ministries and main administrations pertaining to forestry, 10 scientific research institutions of the USSR Academy of Sciences, 8 academies of sciences of Union republics, 3 universities, 4 pedagogic institutes, VUZ's and scientific research institutes concerned with forestry (10), agriculture (8), medicine and pharmaceuticals (8), as well as 4 technological and 2 cooperative institutes, 2 preserves and 3 production organizations.

This publication included summaries of 257 papers, the authors of which consisted of 365 associates from scientific research institutions, experimental stations and forestry production organizations in Moscow, Leningrad and many other cities of European USSR, West and East Siberia and the Soviet Far East.

Papers dealing with general aspects of the subject matter were singled out in a special section, "Forest Resource Management and Its Tasks in Implementation

*"Problemy prodovol'stvennogo i kormovogo ispol'zovaniya nedrevesnykh i vtorostepennykh lesnykh resursov (Tez. dokl. Vses. soveshch., 24-26 maya 1983 g.)" [Problems of Utilization of Nonarboreal and Secondary Forest Resources for Food and Feed (Summaries of Papers Delivered at All-Union Conference, 24-26 May 1983)], Krasnoyarsk, 1983, 270 pages.

of the Food Program" (a total of 23 papers, or 9% of all papers). The others were distributed in 4 sections: "Wild Forest Berries" (82 papers, or 32%), "Forestry Products Used for Feed" (55 and 21%), "Mushrooms and Other Edible Plants" (50 and 20%) and "Medicinal Forest Plants" (47 and 18%).

The general papers devoted themselves to theoretical aspects of botanical and forest resource management (P. D. Sokolov, S. Ya. Tyulin, Botanical Institute imeni V. L. Komarov, USSR Academy of Sciences, Leningrad; A. F. Cherkasov, Experimental Forestry Station, Kostroma), status and objectives of studying non-arboreal and secondary forest resources (A.G. Izmodenov, Khabarovsk Polytechnic Institute), questions of keeping records of them (D. K. Budryunene, Lithuanian Scientific Research Institute of Forestry, Kaunasskiy Rayon, Girionis; N. G. Vasil'yev, and A. I. Polyakov, Main Administration for the Protection of Natural Resources, Preserves, Forestry and Hunting, USSR Ministry of Agriculture, Moscow; S. A. Gensurik, SOPS [Council for the Study of Productive Resources] of UkSSR, Ukrainian Academy of Sciences, Kiev) and organization of optimum and broader utilization, primarily both food and fodder products of the forest (L. A. Kaziratskiy, Oblast Administration of Forestry and Logging, Zhitomir; Ye. V. Kucherov, Institute of Biology, Bashkir Affiliate of USSR Academy of Sciences, Ufa; E. D. Levin, T. V. Ryazanova and I. I. Astapkovich, Siberian Technological Institute, Krasnoyarsk; Z. M. Naumenko, Scientiifc Research Laboratory for Feed Resources of the Forest, Leningrad; V. A. Polyakov, Ukrainian Scientific Research Institute of Forestry, Kharkov; I. V. Semechkin and B. S. Spiridonov, ILiD, Siberian Department of USSR Academy of Sciences, Krasnoyarsk; S. F. Sulatskov, RSFSR Ministry of the Forestry Industry, Moscow; S. M. Tarasov, Gaming Administration of RSFSR Main Administration of Hunting and Game Preserves, Moscow; A. N. Chuprov and T. Ye. Terskikh, Siberian Scientific Research Institute of the Forestry Industry, Krasnoyarsk; V. I. Yagodin, Forestry Engineering Academy imeni S. M. Kirov, Leningrad). Much attention was given to methodological aspects of keeping records of stock (S. N. Koz'yakov, Ukrainian Agricultural Academy, Kiev; I. L. Krylova, All-Union Scientific Research Institute of Medicinal Plants, Moscow Oblast), determination of volume of possible procurements (N. A. Borisova, Leningrad Institute Chemical-Pharmaceutical) and mapping of existing resources (V. V. Barykina and L. N. Il'ina, Institute of Geography, USSR Academy of Sciences, Moscow).

The papers combined in the section entitled "Wild Berries of the Forest" submitted data on a survey of thickets of berry plants, determination of their output and resources in different parts of the country, volume of procurement and man's effect on condition of thickets of the used species, and suggestions were also offered concerning organization of wise utilization of berry plants in forests. Several papers shed light on questions of developing methods for keeping records of berry plant productivity and forecasting berry harvest. Much attention was devoted to procedures for raising some species on plantations and cultivating the naturally occurring thickets. In discussing these matters, more than 20 species of berry plants were mentioned, and the most attention was given to the following: Vaccinium vitis-idaea L. mountain cranberry, V. uliginosum L. bog whortleberry, V. myrtillus L. bilberry, Oxycoccus palustris Pers. small cranberry, O. quadripetalus Gilib. and O. microcarpus Turcz. ex Rupr. cranberries, as well as the introduced species, O. macrocarpum Ait. large cranberry and Vaccinium corymbosum L. tall-growing whortleberry.

The section, "Forest Feed Products," combined chiefly papers which described developments pertaining to fuller and combined use of tree biomass. They touched upon questions of multipurpose utilization of tree-felling waste and tree foliage, keeping records of the entire phytomass of forest tree species with determination of available stock of their different elements existing in the forests, which remain after logging and organization of their practical utilization. The papers reported on the results of experimental work and recommendations on use of timber waste (including branches and stumps) to obtain charcoal, saccharified mass and sawdust, which are used to feed domestic animals. In addition, timber waste is a substrate for growing microorganisms and fungi, the products of which constitute an urgently needed protein and multiple vitamin supplement to the feed allowance of farm animals. Much attention was devoted in the papers to the possibility of multilevel utilization of tree foliage. It is recommended for animals in fresh form and utilization to prepare twig fodder, forest silage, vitamin meal and paste, as well as for recovery of essential oils. The bark of trees may find diverse applications: to fertilize fields, recover tanning agents, essential oils (and other chemical compounds) and as a feed supplement. Some papers were concerned with problems of increasing productivity of useful plants and enriching the nonarboreal resources of the forest by growing feed and medicinal plants on forest land.

The section on "Mushrooms and Other Edible Forest Plants" included papers concerned with problems of utilizing mushrooms and some higher plants as food. Many of them listed the edible species of mushrooms in different regions, indicated the existence of many little-known edible species and, in addition, attention was devoted to the dependence of mushroom harvest and quality on ecological conditions and meteorological features of the year. Suggestions were offered as to methods of detecting areas with mushrooms and keeping records of mushroom harvest. Several papers submitted data on cultivating mushrooms, in particular, species of the Pleurotus (Fr.) Kummer oyster mushroom and Pholiotus mutabilis (Schaff.) Quel summer mushroom. The papers delivered in this section provided lists of higher plants that can be used as food in some parts of the country; they touched upon questions of procurement and, in particular, mechanization of labor-consuming processes. Much attention was given to questions of utilizing the Pinus sibirica Du Tour Siberian stone pine and Pteridium aquilinum L. bracken as food plants. The same section included papers dealing with melliferous plants in the Carpathian region and Bashkiria.

Papers dealing with the feasibility of medicinal use of species were combined in the section entitled "Medicinal Forest Plants." Some papers offered a survey of medicinal plants in some regions of the nation's forest zone; others discussed the prospects of searching for new medicinal plants and studying those already known in their natural habitat; there was discussion of questions related to development of optimum methods of using them (in particular, determination of optimum time for procurement of raw materials), keeping records of reserves and organizing procurement, determining the economic efficiency of gathering plants as they occur in nature and feasibility of cultivating some species. The papers mentioned more than 70 species of medicinal plants, the most attention being given to such medicinal plants as Arctostachylos uva-ursi (L.) Spreng. bearberry, Ledum palustre L. marsh tea, cowberry and bilberry.

All of the above-mentioned questions were heard and discussed at plenary and section meetings. The speakers commented on the poor development of theoretical theses on botanical and forest resource management, need for further development of work to define the means of combined and multipurpose utilization of plant resources of the forest, as well as intensification of research to develop methods for optimum utilization and conditions for exploiting useful forest plants. Attention was called to the importance of expanding research to identify economically useful properties of forest species and their in-depth investigation as useful plants. Mention was made of the need to unify methods and investigate the distinctions of reproduction and development of useful species, demonstration of the dynamics of useful substances they contain. Many of the speakers and audience who participated in the discussions were in favor of development of indirect methods of locating reserves of plant raw materials, which would make it possible to take them into consideration when making assessments of forests.

The decision of the conference commented on the appreciable increase in interest of scientific and industrial organizations in studying and using nonarboreal and secondary resources of forests; however, these sources of plant raw materials are still being used quite little and the demands of the national economy are not being fully satisfied with regard to these materials. The conference pointed to the poor link and coordination of scientific research among agencies, scientific research institutions, various scientific and coordinating councils and societies that are engaged in research to find and investigate useful plants growing in the wild. It was noted that use of different methods to determine productivity of species and keep records of stock of raw materials hinder better investigation of useful wild plants and generalization of obtained data. There is poor development of economic questions related to procurement of raw materials in the forest, cultivating the naturally occurring thickets of useful plants in forests and raising some of them as cultivars. Not enough attention is being given to mechanization of labor-consuming processes and increased labor productivity in procuring and processing nonarboreal forest products.

The conference appealed to all concerned agencies, scientific research and production organizations to expand and deepen studies of nonarboreal and secondary resources of the forest, as well as to eliminate the noted flaws.

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10,657
CSO: 1840/1051

UDC: 633.88(571.1/.5+571.6):061.3(47+57)

ALL-UNION CONFERENCE ON 'PROBLEMS OF DEVELOPING MEDICAL RESOURCES OF SIBERIA AND FAR EAST' (18-20 OCTOBER 1983, NOVOSIBIRSK)

Leningrad RASTITEL'NYYE RESURSY in Russian No 2 (manuscript received 15 Dec 83) pp 290-294

[Article by V. G. Minayeva, I. F. Satsyperova and O. D. Barnaulov, Central Siberian Botanical Garden, Siberian Department of USSR Academy of Sciences, Novosibirsk, and Botanical Institute imeni V. L. Komarov, USSR Academy of Sciences, Leningrad]

[Text] The All-Union Conference on the Problem of Developing the Medicinal Resources of Siberia and the Far East convened in Novosibirsk on 18-20 October 1983; it was convoked at the instigation of the Siberian Department of the USSR Academy of Medical Sciences with participation of the Main Pharmaceutical Administration of the USSR Ministry of Health (GAPU MZ SSSR), the All-Union Scientific Research Institute of Pharmaceuticals of the USSR Ministry of Health (VNIIF, MZ SSSR), All-Union Scientific Society of Pharmacists and the Novosibirsk Pharmacy Administration. The main purpose of this conference was to coordinate work on investigation and development of natural, mainly medicinal, plant resources of the area and work out the strategy for further deployment of research on this problem in accordance with the decree of the CPSU Central Committee and USSR Council of Ministers "On Further Development of Medical Science in Regions of Siberia and the Far East" (1979). The agenda of the conference included 19 papers, 16 of which were delivered at plenary sessions. In addition, round-table discussions were organized to deal with the following issues: resource science [or management]; chemical and biochemical investigation of active substances and their biological activity; introduction of medicinal plants. Summaries of the papers were published, which included 186 reports on the following problems: 1) resources, introduction of medicinal plants and questions of improved supply of phyto agents for the public; 2) chemical, biochemical and phenological aspects of investigation of medicinal agents of natural origin; 3) pharmacological investigation of agents of natural origin; 4) clinical data on phytopreparations.

Participants in the conference included about 400 local specialists and more than 100 from different cities of our country: Alma-Ata, Ashkhabad, Vilnius, Dushanbe, Kazan, Kiev, Kursk, Leningrad, Minsk, Moscow, Pyatigorsk, Riga, Sverdlovsk, Tashkent, Tbilisi, Ufa, Kharkov, Tselinograd, as well as major cities of Siberia and the Soviet Far East: Barnaul, Vladivostok, Irkutsk, Kemerovo, Krasnoyarsk, Novokuznetsk, Omsk, Tomsk, Ulan-Ude, Khabarovsk and

Yakutsk. Among the conference participants, there were not only associates of scientific institutions and VUZ's, but of the RSFSR Gosplan, USSR Ministry of Defense, Soyuzlekrasprom [All-Union Association for Production, Procurement and Processing of Medicinal Plants, USSR Ministry of the Medical Industry], Glavokhota [Main Administration of Hunting and Game Preserves] and Roskhimfarmtorg [RSFSR Chemical and Pharmaceutical Trade Office] associations, as well as pharmacy workers. In addition, representatives of the pharmaceutical firm, BILKOOP (Bulgaria) came to the conference and demonstrated to the conference participants an exhibit of the different teas put out by this firm.

The opening remarks at the conference were delivered by Yu. P. Nikitin, academician of the USSR Academy of Medical Sciences, deputy chairman of the Presidium of the Siberian Department of the USSR Academy of Medical Sciences, who stressed the importance of this conference to strengthening the health of the region's inhabitants, particularly those of intensive industrial development, and formulated the main tasks confronting the participants at the conference. O. A. Volkov, GAPU MZ SSSR, Moscow), in his paper "On Measures for Further Supply to the Public of Medicinal Plants," called the attention of the audience to the fact that in the next few years the nation's entire population will be placed under dispensary supervision, which will require a considerable increase in output of drugs of plant origin and, consequently, an increase by several times in the plan for procurement of medicinal raw materials. N. R. Deryapa (Siberian Department of the USSR Academy of Medical Sciences, Novosibirsk), corresponding member of the USSR Academy of Medical Sciences, with reference to the status of development of the program "Medicinal plants of Siberia and the Far East," which was approved in 1980, observed that its general objective is to find and make an in-depth study of medicinal agents of plant origin used for prevention and treatment of acute and chronic diseases. The main directions of work on this program are: 1) primary search for new medicinal plants and evaluation of their resources; 2) introduction of plants; 3) chemical study; 4) pharmacological study; 5) clinical trial; 6) system of introduction; 7) protection of plants; 8) economic study. The staff of 30 scientific and production organizations located in Siberia and Soviet Far East are working on this program.

A. I. Tentsova (VNIIF MZ SSSR, Moscow), in her paper entitled "Status and Prospects of Studying Medicinal Plants as Related to the 'Pharmaceuticals' Problem of Scientific Council No 10, 'USSR Pharmacology and Pharmaceuticals," observed that, at the present time, the Pharmacological Committee of the USSR Ministry of Health has approved the use of 270 species of medicinal plants. Research on medicinal plants is being pursued in five main directions: science of resources, pharmacology, introduction and breeding, biochemistry and culture of tissues. It is imperative to pay attention to elaboration of integrated regional research programs, which would make it possible to come closer to a unified All-Union program of research work.

N. V. Kosenko (All-Union Soyuzlekrasprom Association, Moscow) directed the attention of the audience to the fact that all drugs must be provided with an adequate base of raw materials. In order to accomplish this, it will be necessary to change to a new form of producing medicinal raw materials, to establish specialized farms, i.e., to expand areas of medicinal plant cultivation.

Various aspects of resource science, including introduction of medicinal plants of Siberia and Soviet Far East, were touched upon in the papers delivered by A. V. Polozhiy (Tomsk State University imeni V. V. Kuybyshev--TGU), A. S. Saratikov and Ye. A. Krasnov (Tomsk State Medical Institute--TMI), V. G. Minayeva (Central Siberian Botanical Garden--TsSBS) of the Siberian Department of the USSR Academy of Sciences (Novosibirsk), D. A. Murav'yeva (Pyatigorsk Pharmaceutical Institute) and A. I. Shreter (All-Union Scientific Research Institute of Medicinal Plants (VILR, Moscow Oblast).

Interesting data were reported pertaining to the study and prospects of using the legacy of Tibetan medicine (V. V. Kaznacheyev, Institute of Clinical and Experimental Medicine, Siberian Department of USSR Academy of Medical Sciences, Novosibirsk; S. M. Nikolayev, Institute of Biology, Buryat Affiliate of Siberian Department of USSR Academy of Sciences, Ulan-Ude).

Questions were also raised at the conference about chemical and technological investigation of medicinal plants (A. P. Prokopenko, All-Union Scientific Research Institute of Chemistry and Technology of Medicinal Agents, Kharkov), problems of integrated use of medicinal plants and waste-free technology of producing drugs (M. A. Dzhumayev, Khabarovsk Pharmaceutical Institute), as well as investigation of the geochemical aspect of medicinal plants (N. I. Grinkevich, First Medical Institute imeni I. M. Sechenov, Moscow). Unfortunately, the implications of using phytopreparations in the treatment and prevention of neoplastic diseases were demonstrated only in the paper of V. S. Pashinskiy (Tomsk Affiliate of All-Union Oncological Research Center of the USSR Academy of Medical Sciences (TOTs AMN SSSR).

Four of the six scheduled round-table discussions were held during the conference.

The round-table discussion of investigation of the flora of Siberia and the Far East in the resource science aspect was chaired by the directors of this discussion, A. I. Shreter (VILR) and A. V. Polozhiy (TGU). There was discussion essentially of 2 out of the 47 questions raised: terminology and concepts of botanical resource science and methods of investigating the reserves of medicinal plants. A. I. Shreter, G. P. Yakovlev (Leningrad Chemical and Pharmaceutical Institute--LKhFI), I. F. Satsyperova (Botanical Institute imeni V. L. Komarov, USSR Academy of Sciences--BIN AN SSSR--Leningrad) and P. D. Sokolov (BIN AN SSSR) spoke on the first topic. All of the speakers indicated that resource specialists have started to make free use not only of existing terms, but their own newly introduced terms, without providing a clear definition, in recent years. This often makes it difficult to comprehend the material in question and causes confusion. All of the round-table participants agreed that it is high time to prepare a glossary of resource-science terms and publish articles dealing with terminology.

N. A. Borisova (LKhFI), A. I. Shreter, G. P. Yakovlev and A. V. Polozhiy discussed the methods used to investigate the reserves of medicinal plants; they called the participants' attention to the fact that there are several methods of estimating the reserves of medicinal plants, and as a result the data obtained by different authors often cannot be compared. For this reason, some thought should be given to development of a unified method for determining medicinal plant reserves.

The combined round-table discussion on experimental investigation of biological activity of medicinal plants and pressing problems of investigating the composition and accumulation of active substances was chaired by A. S. Saratikov (TMI) who listed the main issues to be discussed.

The participants' attention was attracted the most to various aspects of the strategy of searching for new products derived from plants. A. I. Shreter, A. S. Saratikov and V. G. Minayeva (TsSBS SO AN SSSR) voiced the opinion that the search should begin with information gathering and preparation of a data bank pertaining to medicinal plants of the region. The next stages of the search were discussed comprehensively. In the opinion of K. A. Meshcherskaya (Vladivostok), biochemical screening of medicinal plants is not sufficient by itself to find new medicinal agents, and it is suitable only when the active substances are known. T. P. Berezovskaya (TMI), who agreed with this, mentioned the leading role of chemical screening to detect plants that are candidates for pharmacological investigation. V. G. Minayeva favored a differentiated approach: when selective biochemical screening (for example, to detect flavonoids) is performed, it would be expedient to first conduct a biochemical study of a considerable number of species and submit the most promising ones to pharmacological investigation; in other instances, however, it might be more beneficial to begin with pharmacological screening. A. S. Saratikov upheld this point of view, adding that, in his opinion, chemical screening is always justified, if only in the chemotaxonomic respect, whereas the question of which screening, chemical or pharmacological, should be used first must be decided separately in each specific instance. Ye. A. Krasnov (TMI) favored concurrent chemical and pharmacological screening.

Problems of chemical studies of plants were raised by A. A. Semenov (Irkutsk Institute of Organic Chemistry, Siberian Department of USSR Academy of Sciences) and Ye. A. Krasnov. A. A. Semenov noted the importance of the level of chemical work being done and availability of modern equipment for investigation of active substances. In his opinion, constant contact between the chemist and pharmacologist is a mandatory condition for such work to be effective. Ye. A. Krasnov was in favor of chemical investigation of plants, even without an adequate base of raw materials, since identification of the structure of active substances opens the way for their synthesis and, in a number of instances, makes it possible to predict their biological activity.

The list of problems raised for discussion by pharmacologists pertained mainly to the starting points in the search for new drugs of plant origin, methods of screening and comprehensive investigation of pharmacological properties, as well as harmlessness of phytopreparations. A. S. Saratikov shared his own experience in studying different fractions of the Rhodiola rosea L. root and demonstrated the difficulty of isolating the active ingredient, salisazide, as well as the fact that it is not mandatory to introduce a chemically pure substance to medical practice. A. S. Saratikov, S. M. Nikolayev (Institute of Biology, Buryat Affiliate of Siberian Department of the USSR Academy of Sciences), O. D. Barnaulov (BIN AN SSSR), S. V. Kaznacheyev (Institute of Clinical Experimental Medicine, Siberian Department of USSR Academy of Medical Sciences) and others observed in their speeches that data on the purpose and modes of use in systems of traditional medicine, for example, in the Buryat branch of Tibetan medicine, constitute the starting point for comprehensive investigation of various products derived from plants, including complex ones.

K. A. Meshcherskaya discussed the significance of so-called ballast [inactive] substances contained in food and medicinal plants. It was experimentally proven that the presence of such substances in food (for example, unrefined brown sugar) prolongs the life of animals. This was also reflected in the speech of K. V. Yeremenko (TOTs AMN SSSR), who demonstrated, on the example of assessing the role of phytopreparations in oncology, the multifaceted nature of effects of galenics: symptomatic, preventive, cytostatic detoxifying and metastases-preventing effects. K. V. Yeremenko stressed that it is impossible to unilaterally evaluate the properties of phytopreparations, since their systemic action also implies systemic evaluation of therapeutic efficacy. Developing this thought, V. G. Pashinskiy (TOTs AMN SSSR) called attention to the preventive significance of phytotherapy and need to use complex, multi-constituent agents with their unique complexes of naturally-occurring compounds.

O. D. Barnaulov observed that it is necessary to investigate the property of medicinal plants of scientific and empirical medicine of enhancing organ and tissue resistance to alteration (injury). In his opinion, one of the basic principles, but one that has not been formulated, of using plants in folk medicine is to use their capacity to reduce the extent of alteration, which is confirmed in experimental work. The anti-alteration (adaptogenic) properties of phytopreparations are not the exception, but their background.

With reference to questions of preparing agents of plant origin for clinical investigation and the progress of such investigation, S. V. Kaznacheyev expressed the idea of a combined approach to the medicinal plant when it is used clinically, with consideration of all of the plant's properties and distinctions of each patient. V. G. Pashinskiy called attention to the need for a differentiated approach to plant preparations, from the standpoint of their suitability for treatment of acute and chronic diseases. I. A. Zaikonnikova (Kazan State Medical Institute) mentioned the difficulties involved in clinical trials of phytopreparations because of the lack of pertinent training of physicians, and she proposed that a course on phytotherapy be introduced at all medical institutes. She cited examples of difficult introduction of prepared agents of plant origin to medical practice because of the absence of appropriate documentation with regard to standards and specifications.

Several speakers voiced their approval of the experience of developing medicinal teas in Bulgaria, commenting on the unquestionable progressiveness of such a step, availability to wide strata of the population of such a method of treating and preventing diseases, as well as the need for speedy assimilation of the knowhow of Bulgarian colleagues. At the same time, it was stressed that development of numerous medicinal teas is difficult at the present time, since the system of testing and introducing phytopreparations used by the Pharmacological Committee of the USSR Ministry of Health is extremely labor-consuming and holds back speedy solutions to such problems.

All of the speakers were unanimous in their opinion that it is necessary to develop integrated studies of medicinal plants in Siberia, the Soviet Far East and other parts of the USSR.

In conclusion, A. S. Saratikov offered a brief summary of the round-table discussion, mentioning the need to have all concerned institutions participate

in implementing the "Medicinal Plants of Siberia and Far East" program to increase the effectiveness of research.

The round-table discussion of problems of introduction of medicinal plants was chaired by K. A. Sobolevskaya (TsSBS SO AN SSSR), who listed 15 main issues to be discussed in her opening remarks, of which the following were covered: exchange of experience in introduction work, need to investigate the ontogenesis of medicinal plants, problems of growing seeds of medicinal plants, producing cultivar material, additional reserves for forming a raw materials base to provide for the needs of the pharmaceutical industry, link between scientific and production institutions, forms of introduction of scientific achievements.

The following participated in the discussion: I. F. Satsyperova (BIN AN SSSR), Ye. V. Tyurina (TsSBS SO AN SSSR), A. I. Brykin (VILR), N. B. Sukhareva (Biological Institute, Siberian Department of USSR Academy of Sciences, Novosibirsk) and N. D. Orishchenko (Novosibirsk ZOS [zonal experimental station] of VILR, Novosibirsk Oblast). All of them stated that, in order to meet the needs of the pharmaceutical industry with regard to medicinal raw materials, it is necessary to broaden the assortment of crops raised and areas used for them. Attention must be given to the need for deeper investigation of plants for introduction, in particular observation of ontogenetic plant development. Attention was also called to the fact that cultivar material is still not available for many medicinal plants, as well as the need to establish specialized seed-growing farms.

The link between scientific and production organizations can be in the form of economic and creative agreements for collaboration. The scientific institutions must transmit to industrial enterprises, in addition to planting or sowing material, instructions or recommendations on raising the introduced crops.

In her concluding remarks, K. A. Sobolevskaya voiced satisfaction that burning issues were discussed that are related to introduction, and she expressed the wish to prepare a methodological manual, through the joint efforts of specialists in introduction, on how to conduct observations of plants during the introduction period of their investigation.

The last meeting of the conference proceeded in the form of a free discussion, during which questions were covered dealing with chemistry and technology of agents derived from plants when preparing to introduce them, combined use of medicinal raw materials and development of unified methods of studying medicinal plants, as well as several organizational questions dealing with procurement and drying plants.

In conclusion, a resolution was adopted, which reflected the basic problems confronting researchers on the way toward successful utilization of the flora of Siberia and the Soviet Far East for development of effective drugs.

It should be noted that the conference was very well-organized; it proceeded on a high scientific level and inspired lively discussions of a number of important issues pertaining not only to problems of developing the medicinal resources of Siberia and Soviet Far East, but other regions of the Soviet Union.

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CSO: 1840/1051

FIFTH ALL-UNION CONFERENCE ON ECOLOGICAL PHYSIOLOGY AND BIOCHEMISTRY OF FISH, AND ALL-UNION SEMINAR ON POPULATION PHYSIOLOGY AND BIOCHEMISTRY OF FISH

Moscow VOPROSY IKHTIOLOGII in Russian No 2, Mar-Apr 84 (signed to press 21 Feb 84) pp 345-347

[Article by L. K. Frolova and M. I. Shatunovskiy]

[Text] The Fifth All-Union Conference on Ecological Physiology and Biochemistry of Fish convened from 17 to 19 Novebmer 1982 in Sevastopol. It was organized by the Ichthyological Commission of the USSR Ministry of the Fish Industry, Institute of Biology of the South Seas of the Ukrainian Academy of Sciences and Scientific Council of the USSR Academy of Sciences for Problems of Ichthyology, Hydrobiology and Utilization of Biological Resources of Waters. The First All-Union Seminar on Population Physiology and Biochemistry of Fish was held on 20 November at the Institute of Biology of the South Seas, Ukrainian Academy of Sciences.

The work of the conference proceeded in the form of meetings of three symposiums, each of which was scheduled for 1 day: 1) physiological and biochemical aspects of adaptation, 2) regulation of physiological and biochemical processes, 3) physiology and biochemistry of life cycles. The work of each symposium consisted of delivering and discussing plenary and poster-session [section] papers.

There were 200 participants in the conference and seminar representing institutions of the USSR Academy of Sciences, academies of Union republics, fish industry ministries of the USSR and Union republics, USSR Ministry of Higher and Secondary Specialized Education. A total of 26 plenary and 118 section papers were delivered.

The first symposium on "Physiological and Biochemical Aspects of Adaptation" was held on 17 November and it was headed by V. I. Luk'yanenko. At this symposium, 7 plenary and 56 section papers were delivered. The paper of V. A. Matyukhin and K. A. Shoshenko, "The Circulatory System and Muscular Function of the Black Baykal Grayling," submitted the results of studying blood flow rate in white and red muscles of this species, which has a highly differentiated skeletal musculature and small heart. L. B. Klyashtorin (All-Union Scientific Research Institute of Sea Fisheries and Oceanography--VNIRO) discussed the distinctions of physiology of respiration and regulation of gas exchange in fish differing in ecology, in his paper entitled "Respiration and

Oxygen Requirements of Fish," devoting special attention to questions of evaluating fish sensitivity and resistance to oxygen deficiency and compensatory respiratory mechanisms.

In her paper entitled "Role of Phospholipids in Natural Adaptation of Fish," L. F. Pomazanskaya (Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences) showed that total content of highly unsaturated fatty acids is greater in all phospholipid fractions of the brain of cold-blooded fish, with the exception of phosphatidyl inositol. These distinctions of fatty acid composition provide for normal function of brain cell membranes.

The distinctions of physiological and biochemical processes in hydrobionts exposed to surfactants were the topic of the paper of A. Ya. Malyarevskaya (Institute of Hydrobiology, UkSSR Academy of Sciences), who analyzed the metabolic changes in hydrobionts under the influence of toxicants, and chiefly disturbances referable to redox processes.

The last paper in this symposium was delivered by V. S. Sidorov (Institute of Biology of the Karelian Affiliate of the USSR Academy of Sciences) under the title of "Ecological Aspects of Biochemistry of Fish." In this paper, which inspired very much interest, there was validation of use of a number of biochemical parameters as indicators of physiological changes in fish under the effect of environmental factors.

A large group of toxicological papers was discussed at the poster session (by T. P. Akhmedova, V. K. Dokholyan, Sh. A. Berman, O. Ye. Perepelitsyna, A. B. Borisyuk, O. P. Danil'chenko, I. Yu. Yevtushenko, A. E. Il'zini, Yu. S. Kaganskiy, T. A. Karpovich, B. I. Kolupayev, A. M. Beym, N. S. Kirilenko, A. I. Korableva, A. O. Kostyuk, I. I. Lesyuk, S. G. Reshetilo, O. B. Savin, N. I. Igumentseva, A. A. Ugrin, T. D. Malyzheva, G. A. Malyarevskaya, L. N. Sineva, V. N. Kosolapov, A. I. Taneyeva). These papers dealt with effects of various toxicants--heavy metals, pesticides, detergents, etc.--on protein metabolism, activity of different enzymes, blood parameters, respiration and motor activity.

A large group of papers was devoted to physiology and biochemistry of nutrition and growth of fish in hatcheries (N. M. Belkovskiy, V. V. Lavrovskiy, S. V. Yermakova, L. A. Timoshina, V. V. Zalepukhin, V. A. Andianov, R. A. Vorob'yeva, N. N. Kapalin, V. P. Panov, Yu. I. Yesavkin, N. S. Kirilenko, N. V. Trudova, T. B. Semenkova, N. T. Sergeyeva, L. P. Smirnov, A. A. Yarzhombek, M. A. Shcherbina, N. V. Rekubratskiy, A. Yu. Kiselev, T. V. Shcherbina).

Several papers (by R. U. Vysotskaya, T. R. Ruikolaynen, M. Yu. Krupnova, I. D. Il'ina, D. I. Ivanov, A. A. Yarzhombek, V. V. Kuz'mina, V. A. Kulik, T. P. Serebrenikova, V. V. Khablyuk, M. T. Proskuryakov) submitted data on dependence of fish enzyme activity on exogenous and endogenous factors. Interesting papers were delivered by the Institute of Biology of Inland Waters, USSR Academy of Sciences (IBVV): concerning change in protein and ion composition of fish blood serum, as well as functional distinctions of the immune system under the effect of various factors (V. R. Mikryakov, V. V. Lapkin, Ye. N. Limanskiy, Ye. N. Bekina, N. F. Silkin, E. A. Yur'yeva). We should mention several original studies in the area of fish bioenergetics, which were made primarily by the staff of INBYuM [Institute of Biology of Southern Seas,

UkSSR Academy of Sciences] (Yu. S. Ahikina, V.M. Kribun, Yu. S. Belokopytin, A. Ya. Stolbov, Z. A. Muravskaya). Considerable interest was shown in papers dealing with functions of the circulatory and respiratory systems of fish (V. A. Amineva, A. S. Suzdal'tsev, V. V. Vyazova, T. V. Neshumova, Yu. N. D'yakonov). It was commented at the conference that the poster session for the first symposium was a success.

The second symposium, which convened on 18 November, was on the subject of "Regulation of Physiological and Biochemical Processes" (chaired by I. A. Barannikova). Four plenary and 23 section papers were delivered at this symposium. The paper of I. A. Barannikova (Central Laboratory for Reproduction of Fish Stock of Glavrybvod [Main Administration for Pisciculture?], "Hormonal Regulation of Functions, and the Problem of Controling Life Cycles of Fish," submitted the findings from a study of hormonal regulation in fish with different modes of life and data on use of these results in fisheries.

Much interest was inspired in conference participants by the paper of S. I. Gorgolyuk and A. A. Neyfakh (Institute of Developmental Biology--IBR--of the USSR Academy of Sciences), "Regulation of Polyamine Synthesis as a Mechanism of Fish Adaptation to Temperature," in which they described a basically new mechanism of rapid temperature adaptation on a molecular level, on the basis of investigations with use of complex modern methods.

Interesting data were submitted in the paper of M. M. Sokolova and M. N. Maslova (Institute of Evolutionary Physiology and Biochemistry, USSR Academy of Sciences), "Variability of Concentrations of Osmotically Active Substances, Protein and Erythrocyte Count in the Lamprey and Sockeye Red Salmon as Related to Migration and Spawning."

The last paper of this symposium was by A. B. Burlakov (Moscow State University--MGU), "Physiological Distinctions of Effects on Maturation and Ovulation of Oocytes of Hypophyseal Nonspecific Gonadotropins of Fish Referable to Different Systematic Groups."

At the poster session for this symposium, papers were delivered by different groups of researchers concerned with hormonal regulation of physiological processes in fish. Many papers were submitted by physiologists of Leningrad who worked with Salmonidae and Acipenseridae (I. A. Barannikova, O. S. Bukovskaya, N. A. Yefimova, N. S. Dubrovskaya, V. P. Lyubin, S. G. Kiseleva, L. S. Krayushkina, N. D. Levchenko, S. N. Lyzlova, S. N. Moiseyenko, Z. Ye. Nikitina, G. A. Yuzhakova) and Moscow researchers investigating gonadotropins (N. V. Belova, A. B. Burlakov, L. V. Sivtseva, N. G. Shubnikova). Interesting papers were delivered by Belorussian physiologists (V. A. Bezdenezhnykh, V. B. Petukhov, A. M. Petrikov, G. A. Prokhorchik) and Moldavian scientists (M. G. Talikina, M. P. Statova, R. A. Kalinich, O. I. Krenis, V. P. Tonkoglas, T. S. Beshetya). The paper of the last two authors, on the effects of stress factors on levels of corticosteroids and blood cholinesterase activity in the silver carp, prompted particular interest. The participants at the conference, who discussed the papers, were unanimous in their praise of the organization of the poster session of the second symposium.

The third symposium, on "Physiology and Biochemistry of Life Cycles" (headed by G. Ye. Shul'man and V. N. Zhukinskiy) convened on 19 November. At this symposium, 9 plenary and 31 section papers were delivered. The paper by a team of authors from the Institute of Hydrobiology, UkSSR Academy of Sciences (V. N. Zhukinskiy, R. I. Gosh, Ye. D. Kim, Yu. D. Konovalov, G. F. Nedyalkov and Ye. F. Kopeyka), "Changes in Some Biochemical Parameters and Fertilizing Capacity of Spermatozoa After Cryoconservation of Carp Sperm," was of definite theoretical and practical interest; it offered, for the first time, the biochemical characteristics of sperm that was defrosted after cryoconservation, as compared to fresh sperm, and practical recommendations were given.

The paper of A. Ye. Mikulin and V. V. Petrunyaka (MGU and Institute of Biophysics, USSR Academy of Sciences), "Role of Qualitative Composition of Carotenoids in Fish Roe Metabolism," prompted lively interest. The conception advanced by these researchers on the role of carotenoids is original, though not indisputable.

A team of scientists from Kiev University (S. N. Kadura, S. N. Khrapunov, V. N. Chebannyy and G. D. Berdyshev) delivered a paper entitled "Investigation of Variability of Specific Basic Proteins of Chromatin in the Process of Maturation of Reproductive Products in Males of some Cyrpinidae," which inspired considerable interest in participants at the conference.

P. N. Reznichenko (Institute of Evolutionary Morphology and Ecology of Animals, USSR Academy of Sciences--IEMEZh) delivered a substantial paper, which validated incubation temperature for the roe of commercial fish. L. P. Ryzhkov and A. V. Polina (SevrybNIIproyekt--Northern Fisheries Scientific Research and Planning Institute?] reported on morphophysiological and biochemical parameters of whitefish during the feeding period.

The paper of Yu. G. Yurovitskiy and L. S. Mil'man (IBR, USSR Academy of Sciences), "Change in Isozyme Spectrum and Characteristics of Enzymes in the Course of Differentiation of Fish Skeletal Muscles," was received with great attention.

The next two papers were concerned with physiological and biochemical distinctions of sea fish--mackerel of the North-East Atlantic (M. S. Dobrusin, VNIRO) and lamprey of the Baltic Sea (V. V. Ipatov, Baltic Scientific Research Institute of Fisheries--BaltNIIRKh).

The symposium concluded with the paper of V. I. Lapin and G. Basaanzhav (MGU), which dealt with ecological and physiological distinctions of the Mongolian grayling. At the poster session, papers were delivered submitting data about the chemical composition and physiological processes in fish at different stages of ontogenesis. Many papers characterized mature fish (V. V. Zalepukhin, L. F. Golovanenko, E. A. Savel'yeva, Ye. M. Chebina, N. V. Klovach, N. I. Kozlova, P. N. Kulik, N. N. Lapina, R. A. Popova, Z. A. Bekhtereva, P. O. Ripatti, L. N. Ryzhova, N. I. Silkina, L. I. Tyutrina, L. A. Shapiro), and a series of others was concerned with the early ontogenetic stages (Yu. V. Bityukova, V. A. Tereshchenko, N. K. Tkachenko, A. V. Chepurnov, O. M. Bolgova, T. A. Burakova, V. P. Korzh, I. D. Il'ina, Yu. D. Konovalov, Ye. I. Lizenko, Z. A. Nefedova).

The First All-Union Seminar on "Population Physiology and Biochemistry of Fish" (chaired by M. I. Shatunovskiy) took place on 20 November; 6 plenary and 8 section papers were delivered.

A. F. Karpevich (VNIRO) observed, in a paper entitled "Manifestation of Potential Ecological and Physiological Properties of Hydrobionts as a Function of Place of the Population in the Ecological Range of the Species," that populations of certain widespread species are exposed to a wide range of environmental factors, and they are notable for a number of physiological distinctions. V. I. Luk'yanenko (IBVV, USSR Academy of Sciences) dwelled on the results of studies of population structure of different species and ecological aspects of their biochemical species-specificity as related to change in salinity of our southern seas and acclimatization in a paper entitled "Physiological and Biochemical Bases of Reproduction, Acclimatization and Rational Fishing for Acipenseridae." The paper of G. Ye. Shul'man (INBYuM), "Material-Energy Approaches in Ecological Physiology and Biochemistry of Fish," submitted the results of studies of the annual balance of matter and energy in populations of some widely represented species of Black-Sea fish. M. I. Shatunovskiy (IEMEZh [Institute of Evolutionary Morphology and Ecology of Animals) analyzed the results of comparative population studies of several widely represented species of sea and semianadromous fish, in a paper entitled "Some Patterns of Intraspecific and Intrapopulation Physiological Variability of Fish."

Much interest was shown in a paper by the staff of the Institute of Zoology and Parasitology, Lithuanian Academy of Sciences, A. Astrauskas, Yu. Virbitskas, D. Lukshene and D. Misyunene, "Biological Variability of Ichthyofauna in the Course of Formation of Cooling Water Reservoirs," in which they discussed changes in structure and biological parameters of populations of several widely represented fish species in the cooling reservoir of the Lithuanian GRES. The last paper in the plenary session of the seminar was by A. S. Chikhachev (Azov Scientific Research Institute of Fisheries--AzNIIRKh), "Integrated Studies of Causes of Protein Polymorphism in Fish."

Six of the eight section papers dealt with the result of electrophoretic and immunochemical analysis of population structure of Acipenseridae, Cyprinidae and Percomorphi (G. I. Grigor'yeva, V. G. Sideleva, Ye. V. Kuz'min, A. V. Popov, Yu. N. Perevaryukha, M. F. Subbotkin). The paper of V. G. Golovanov (IBVV, USSR Academy of Sciences) contained data on intraspecific variability of heat-selection reactions in the carp-bream and roach. Much interest was inspired by the poster-session paper of G. Ye. Shul'man, S. Yu. Urdenko and A. V. Getmantsev (INBYuM), "Balance of Matter and Energy in the Black-Sea Whiting."

The plenary and section papers delivered at the conference and seminar were submitted to discussion in an animated and creative atmosphere; there were debates on several issues.

The conference and seminar demonstrated the intensification of coordination of research in our country pertaining to ecological physiology and ecological biochemistry. The papers delivered and material submitted were of great theoretical and practical importance. They reflected progress of basic research in the area of physiology and biochemistry in ontogenesis, ecological

endocrinology, physiology and biochemistry of nutrition and digestion, population physiology of fish. This work is of great interest to the ecology of aquatic organisms, biology and comparative physiology and biochemistry of animals.

In recent years, because of development of intensive forms of fishing and the measures implemented to augment fish productivity of bodies of water, there was intensification of research on physiology of nutrition, growth and reproduction of objects of aquaculture. On the basis of these studies, recommendations were prepared and adopted to upgrade the biotechnology of feeding several of the organisms that are raised, biotechnology of warm-water pisciculture, biotechnology of reproduction of several valuable fish species (Acipenseridae, Salmonidae and phytophages). Many physiological problems are being worked on actively within the framework of integrated special-target programs of the USSR Ministry of the Fish Industry and republic-level scientific and technological programs. In a unanimously adopted decision, the conference outlined the future routes of development of ecological physiological and ecological biochemical investigations in our nation in theoretical and practical areas, special attention being given to development of physiological and biochemical bases of intensification of marketable and industrial pisciculture.

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CSO: 1840/1052

UN FOOD POISONING SEMINAR

Tbilisi ZARYA VOSTOKA in Russian 22 May 84 p 2

[GruzINFORM article]

[Text] International seminars on evaluating mycotoxin food poisoning opened in Tbilisi. The seminars were organized within the framework of the UN Environmental Protection program (UNEP), the FAO, the USSR Commission for UNEP Affairs, and the USSR State Committee for Science and Technology Center for International Projects. The seminar participants comprise specialists from 16 countries of Asia, Africa, and Latin America. Contributing to the presentation of lectures, the conduct of seminars, and practical exercises were prominent scientists and specialists from USSR Ministry of Health, the nation's Ministry of Agriculture, the USSR Academy of Medical Sciences and other institutions and organizations of the Soviet Union as well as noted scientists from Bulgaria, Denmark, India, the Netherlands, Finland, France, Switzerland, Japan, the USA, and the FRG. The seminar program included surveys of world-wide experience gained in the field of mycotoxicology as well as original investigations and projects of Soviet, particularly, Georgian scientists, for utilizing contemporary methods and forms of training. The seminar participants are exchanging scientific-technical information in the field of mycotoxicology. They will be familiarized with the work of the scientific-research institutes and the Sanitary-Epidemiological Service of Georgia. At the opening ceremony of the international seminar which was held on 21 May in the auditorium of the Georgian SSR Ministry of Health Institute of Sanitation and Hygiene imeni G. Natadze, the seminar participants were welcomed by the Chief State Public Health Physican, Georgian Deputy Ministry of Health T. Chkoniya, and Deputy Director of the USSR State Committee for Science and Technology Center for International Projects V. Kudashev. The seminar will last till June 2.

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10TH ALL-UNION CONFERENCE ON TRANSPORT ATP-ASES

Moscow BIOKHIMIYA in Russian Vol 49, No 1, Jan 84 pp 166-168

BOLDYREV, A.A., RUBTSOV, A.M., SVINUKHOVA, I.A. and MEL'GUNOV, V.I.

[Abstract] The 10th All-Union Conference on ATPases was held on April 20-23, 1983 in Alma-Ata at the Institute of Physiology of the Kazakh SSR Academy of Sciences. The participants included more than 70 scientists from 45 laboratories and institutes, representing 16 Soviet cities. The conference was organized in six plenary sessions, 19 communications, and more than 30 poster presentations. The main topics of interest were, of course, function of the transport ATPases, involving the interaction of the substrate and various cofactors with the enzyme active site, as well as the molecular biology of membranes, and the bioorganic chemistry of membrane proteins and lipids. [1501-12172]

BRIEF

MINISTRY OF HEALTH PLENUM--(KirTAG)--Improving the quality of Soviet medical services is largely determined by incorporating into medical practice the scientific-technical achievements in contemporary methods of diagnostics, treatment, and prevention of diseases. Participants in the plenum of the USSR Ministry of Health Scientific-Medical Council which opened in Frunze on 29 May are discussing ways to accelerate scientific-technical progress in public health and medicine in the light of the decisions of the December (1983) and subsequent plenums of the CPSU Central Committee. More than 100 prominent scientists, directors of medical scientific-research institutions and VUZ's, and public health administrators from all of the union republics, Moscow, and Leningrad are participating in the work of the plenum. The holding of such a prestigious scientific-medical forum in Frunze is testimony to the distinct successes accomplished in public health and medical science in Kirgiziya. The plenum was opened by the Chairman of the USSR Ministry of Health Scientific-Medical Council, academician of the USSR Academy of Medical Sciences O. K. Gavrilov. Plenum participants were welcomed by Deputy Chairman of the Kirgiz SSR Council of Ministers Dzh. Ch. Tashibekova who told the guests about the development of public health in Soviet Kirgizstan. Reports at the plenum's first session were presented by O. K. Gavrilov, Kirgiz SSR Minister of Health O. T. Turgunbayev, and Deputy Chairman of the USSR Ministry of Health Scientific Medical Council N. A. Shluger. The plenum of the USSR Ministry of Health Scientific Medical Council, which represents a new impetus to the further development of medical science and improved public medical services, will last two days. Participating in the work of the plenum is the Head of the Science and Educational Institutions Department of the Kirgiz CP Central Committee R. E. Sadykov. [Text] [Frunze SOVETSKAYA KIRGIZIYA in Russian 30 May 1984 p 2] 6289

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31 August 1984